OMRON

Machine Automation Controller

NX-series

System Units

User's Manual

NX-PD1□□□
NX-PF0□□□
NX-PC0□□□
NX-TBX01

Additional NX Unit Power Supply Units
Additional I/O Power Supply Units
I/O Power Supply Connection Units
Shield Connection Units

SYSMAC
always in control

W523-E1-03

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Introduction

Thank you for purchasing a NX-series System Unit.

This manual contains information that is necessary to use the NX-series System Unit. Please read this manual and make sure you understand the functionality and performance of the NX-series System Unit before you attempt to use it in a control system.

Keep this manual in a safe place where it will be available for reference during operation.

Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

For programming, this manual is intended for personnel who understand the programming language specifications in international standard IEC 61131-3 or Japanese standard JIS B3503.

Applicable Products

This manual covers the following product.

- NX-series System Unit

  NX-PD□□□□ /PF□□□□ /PC□□□□
  NX-TBX□□□

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Relevant Manuals

To use the System Unit, you must refer to the manuals for all related products.

Read all of the manuals that are relevant to your system configuration and application before you use the NX-series System Unit.

Most operations are performed from the Sysmac Studio Automation Software. Refer to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for information on the Sysmac Studio.

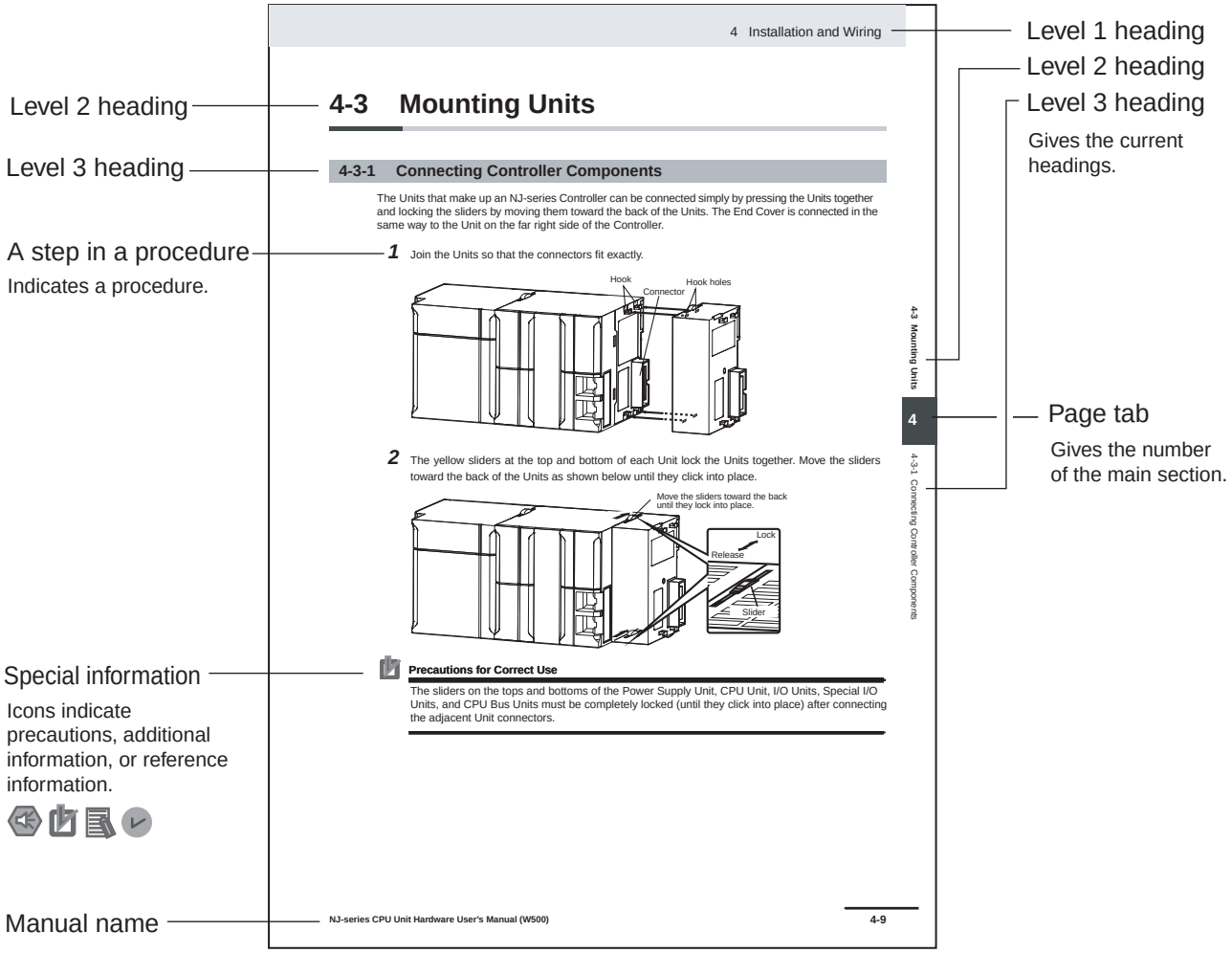
		NJ Series					NX Series						
							Communications Coupler Unit	NX Units					All Units
		NJ-series CPU Unit Hardware User's Manual	NJ-series CPU Unit Software User's Manual	NJ-series CPU Unit Motion Control User's Manual	NJ-series CPU Unit Built-in EtherCAT Port User's Manual	NJ-series Troubleshooting Manual	NX-series EtherCAT Coupler Unit User's Manual	NX-series Digital I/O Units User's Manual	NX-series Analog I/O Units User's Manual	NX-series System Units User's Manual	NX-series Position Interface Units User's Manual	NX-series Safety Control Unit User's Manual	NX-series Data Reference Manual
Learning about the NX-series Units													
	Specifications						●	●	●	●	●	●	
	Functionality						●	●	●	●	●	●	
	Application procedures						●	●	●	●	●	●	
Learning about Slave Terminals							●						
	Slave Terminal specifications						●						
	System configuration						●						
	Rules on building systems						●						
	Slave Terminal application procedures						●						
	Slave Terminal installation procedures						●						
	Support Software connection procedures						●						
	Procedure to estimate Slave Terminal performance						●						
	Procedures for using safety control systems with Slave Terminals											●	
	Procedures for estimating performance of safety control systems with Slave Terminals											●	

		NJ Series					NX Series						
							Communications Coupler Unit	NX Units					All Units
		NJ-series CPU Unit Hardware User's Manual	NJ-series CPU Unit Software User's Manual	NJ-series CPU Unit Motion Control User's Manual	NJ-series CPU Unit Built-in EtherCAT Port User's Manual	NJ-series Troubleshooting Manual	NX-series EtherCAT Coupler Unit User's Manual	NX-series Digital I/O Units User's Manual	NX-series Analog I/O Units User's Manual	NX-series System Units User's Manual	NX-series Position Interface Units User's Manual	NX-series Safety Control Unit User's Manual	NX-series Data Reference Manual
Using NX-series Units with NJ-series Controllers													
	Using a Slave Terminal connected to the built-in EtherCAT port on an NJ-series CPU Unit	●	●		●		●						
	Procedures for performing motion control with Position Interface Units			●							●		
Troubleshooting													
	Managing errors for the overall NJ-series Controller					●							
	Troubleshooting Slave Terminals and Communications Coupler Units						●						
	Troubleshooting NX Units							●	●	●	●	●	
Performing Unit maintenance							●	●	●	●	●	●	
Referencing data lists for NX Unit power consumptions, weights, etc.													●

Manual Structure

Page Structure and Icons

The following page structure and icons are used in this manual.


4 Installation and Wiring
Level 1 heading
Level 2 heading
Level 3 heading
Gives the current headings.
Level 2 heading
4-3 Mounting Units
Level 3 heading
4-3-1 Connecting Controller Components
A step in a procedure
1 Join the Units so that the connectors fit exactly.
Hook
Connector
Hook holes
Indicates a procedure.
2 The yellow sliders at the top and bottom of each Unit lock the Units together. Move the sliders toward the back of the Units as shown below until they click into place.
Move the sliders toward the back until they lock into place.
Lock
Release
Slider
4
Page tab
Gives the number of the main section.
4-3-1 Connecting Controller Components
Special information
Precautions for Correct Use
The sliders on the tops and bottoms of the Power Supply Unit, CPU Unit, I/O Units, Special I/O Units, and CPU Bus Units must be completely locked (until they click into place) after connecting the adjacent Unit connectors.
Icons indicate precautions, additional information, or reference information.
Manual name
NJ-series CPU Unit Hardware User's Manual (W500)
4-9

Note This illustration is provided only as a sample. It may not literally appear in this manual.

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use

Precautions on what to do and what not to do to ensure safe usage of the product.

Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operation easier.

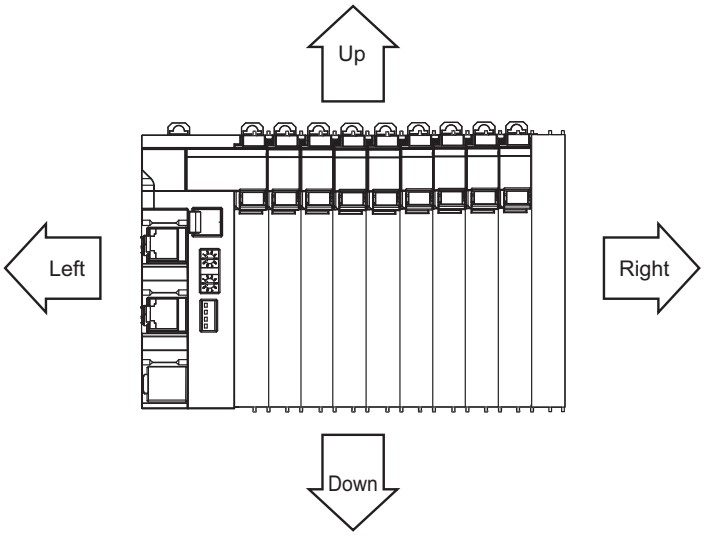
Version Information

Information on differences in specifications and functionality for CPU Units and EtherCAT Coupler Units with different unit versions and for different versions of the Sysmac Studio is given.

Note References are provided to more detailed or related information.

Precaution on Terminology

- In this manual, “download” refers to transferring data from the Sysmac Studio to the physical Controller and “upload” refers to transferring data from the physical Controller to the Sysmac Studio.
  For the Sysmac Studio, synchronization is used to both upload and download data. Here, “synchronize” means to automatically compare the data for the Sysmac Studio on the computer with the data in the physical Controller and transfer the data in the direction that is specified by the user.
- In this manual, the directions in relation to the Units are given in the following figure, which shows upright installation.



Terms and Conditions Agreement

Read and understand this Manual

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Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of an NX-series System Unit.

The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

The following notation is used.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.
⚠ Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Symbols

	The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text. This example indicates prohibiting disassembly.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.
	The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.

Warnings

⚠ WARNING

During Power Supply

Do not touch the terminal section while power is ON.

Electric shock may occur.

Do not attempt to take any Unit apart.

In particular, high-voltage parts are present in Units that supply power while power is supplied or immediately after power is turned OFF. Touching any of these parts may result in electric shock. There are sharp parts inside the Unit that may cause injury.

Fail-safe Measures

Provide safety measures in external circuits to ensure safety in the system if an abnormality occurs due to malfunction of the CPU Unit, other Units, or slaves or due to other external factors affecting operation.

Not doing so may result in serious accidents due to incorrect operation.

Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.

The CPU Unit will turn OFF all outputs from Basic Output Units in the following cases. The remote I/O slaves will operate according to the settings in the slaves.

- If a power supply error occurs.
- If the power supply connection becomes faulty.
- If a CPU watchdog timer error or CPU reset occurs.
- If a Controller error in the major fault level occurs.
- While the CPU Unit is on standby until RUN mode is entered after the power is turned ON

External safety measures must be provided to ensure safe operation of the system in such cases.

The outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure for such problems, external safety measures must be provided to ensure safe operation of the system.

If external power supplies for slaves or other devices are overloaded or short-circuited, the voltage will drop, outputs will turn OFF, and the system may be unable to read inputs. Provide external safety measures in control with monitoring of external power supply voltage as required so that the system operates safely in such a case.

You must take fail-safe measures to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

Not doing so may result in serious accidents due to incorrect operation.

Voltage and Current Inputs

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

Transferring

Always confirm safety at the destination node before you transfer Unit configuration information, parameters, settings, or other data from tools such as the Sysmac Studio.

The devices or machines may operate unexpectedly, regardless of the operating mode of the Controller.

Cautions

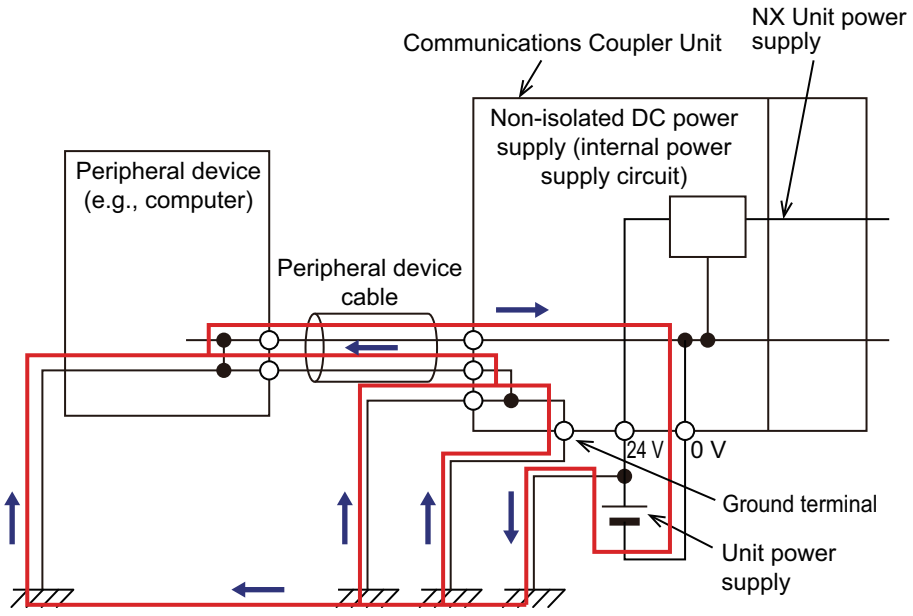
⚠ Caution

Wiring

When you connect a computer or other peripheral device to a Communications Coupler Unit that has a non-isolated DC power supply, either ground the 0-V side of the external power supply (i.e. Unit power supply) or do not ground it at all.

If the peripheral devices are grounded incorrectly, the external power supply (i.e. Unit power supply) may be short-circuited.

Never ground the 24-V side of the power supply, as shown in the following figure.



Online Editing

Execute online editing only after confirming that no adverse effects will be caused by deviations in the timing of I/O. If you perform online editing, the task execution time may exceed the task period, I/O may not be refreshed with external devices, input signals may not be read, and output timing may change.

Precautions for Safe Use

Transporting

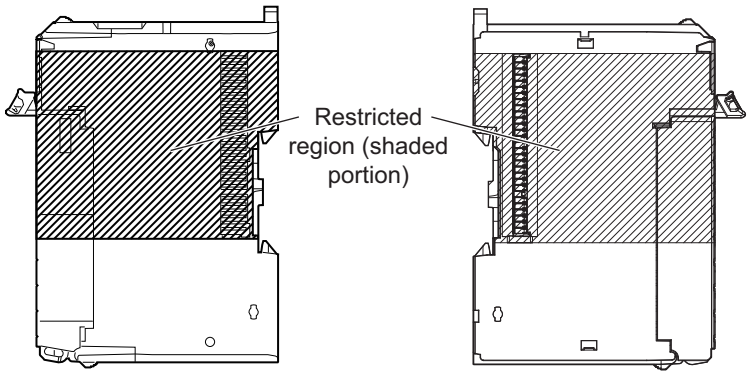
- When transporting any Unit, use the special packing box for it.
  Also, do not subject the Unit to excessive vibration or shock during transportation.
- Do not drop any Unit or subject it to abnormal vibration or shock.
  Doing so may result in Unit malfunction or burning.

Mounting

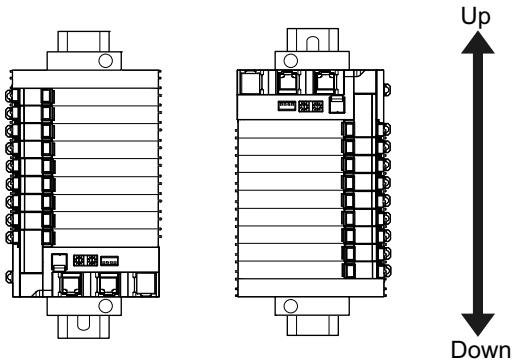
- Mount terminal blocks and connectors only after checking the mounting location carefully.
- Be sure that the terminal blocks, expansion cables, and other items with locking devices are properly locked into place.

Installation

- Do not apply labels or tape to the Unit. When the Unit is installed or removed, adhesive or scraps may adhere to the pins in the NX bus connector, which may result in malfunctions.
- Do not write on the Communications Coupler Unit or an NX Unit with ink within the restricted region that is shown in the following figure. Also do not get this area dirty. When the Unit is installed or removed, ink or dirt may adhere to the pins in the NX bus connector, which may result in malfunctions in the Slave Terminal.



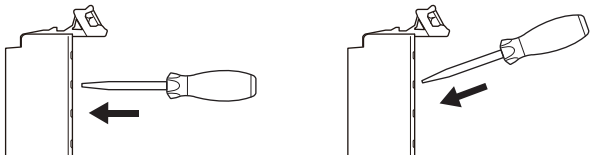
- For the installation orientations in the following figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables. The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured to the DIN Track, which may result in malfunctions.



Wiring

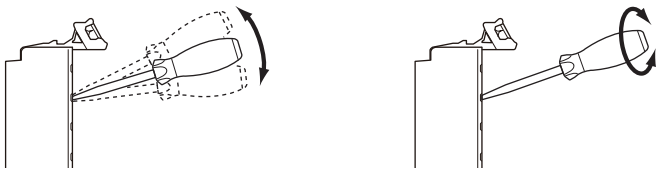
- Double-check all switches and other settings and double-check all wiring to make sure that they are correct before turning ON the power supply.
  Use the correct wiring parts and tools when you wire the system.
- Do not pull on the cables or bend the cables beyond their natural limit. Also, do not place heavy objects on top of the cables or other wiring lines. Doing so may break the cable.
- When wiring or installing the Units, do not allow metal fragments to enter the Units.
- Do not press the flat-blade screwdriver straight into the release holes on a screwless clamping terminal block. Doing so may damage the terminal block.

NG **OK**



- When you insert a flat-blade screwdriver into a release hole on a screwless clamping terminal block, press it down with a force of 30N or less. Applying excessive force may damage the terminal block.
- Do not incline or twist the flat-blade screwdriver while it is in a release hole on a screwless clamping terminal block. Doing so may damage the terminal block.

NG **NG**



Power Supply Design

- Use all Units within the I/O power supply ranges that are given in the specifications.
- Supply sufficient power according to the contents of this manual.
- Use the power supply voltage that is specified in this manual.
- Do not apply voltages that exceed the rated value to any Input Unit.
- Do not apply voltages or connect loads to the Output Units or slaves in excess of the maximum ratings.
- Inrush current occurs when the power supply is turned ON. When selecting fuses or breakers for external circuits, consider their fusing and detection characteristics as well as the above precautions and allow sufficient margin in shut-off performance.
- Install external breakers and take other safety measures against short-circuiting and overcurrents in external wiring.

Turning ON the Power Supply

- When you set the Operating Mode at Startup, confirm that no adverse effect will occur in the system.

Actual Operation

- Before you start operation, always register the NX Units that are connected to the Communications Coupler Unit in the host communications master as the Unit Configuration Information.

- Check the user program, data, and parameter settings for proper execution before you use them for actual operation.
- If you change the fail-soft operation setting, the output status when the error occurs may also change. Confirm safety before you change the fail-soft operation setting.
- If you use fail-soft operation, write programming to determine whether Unit I/O data is valid. Without such programming, the user program cannot distinguish between Units for which I/O refreshing is continued and Units for which I/O refreshing is stopped.

Turning OFF the Power Supply

- Do not disconnect the cable or turn OFF the power supply to the Controller or a Slave Terminal when downloading data or the user program from Sysmac Studio.
- Always turn OFF the external power supply to the Units before attempting any of the following.

  Mounting or removing an NX Unit, Communications Coupler Unit, or CPU Unit
  Assembling Units
  Setting DIP switches or rotary switches
  Connecting or wiring cables
  Attaching or removing terminal blocks or connectors

  Units that supply power continue to supply power to the Units for up to several seconds after the power supply is turned OFF. The PWR indicator remains lit as long as power is supplied. Confirm that the PWR indicator is not lit before you perform any of the above.

Operation

- Confirm that the controlled system will not be adversely affected before you perform any of the following operations.

  Changing the operating mode of the CPU Unit (including changing the setting of the Operating Mode at Startup)
  Changing the user program or settings
  Changing set values or present values
  Forced refreshing

- Always sufficiently check the safety at the connected devices before you change the settings of an EtherCAT slave or Special Unit.

General Communications

- Do not exceed the ranges that are given in the specifications for the communications distance and number of connected Units.

EtherCAT Communications

- Make sure that the communications distance, number of nodes connected, and method of connection for EtherCAT are within specifications.
  Do not connect EtherCAT Coupler Units to EtherNet/IP, a standard in-house LAN, or other networks. An overload may cause the network to fail or malfunction.
- Malfunctions or unexpected operation may occur for some combinations of EtherCAT revisions of the master and slaves. If you disable the revision check in the network settings, check the slave revision settings in the master and the actual slave revisions, and then make sure that functionality is compatible in the manuals or other references. You can check the slave versions in the settings from the Sysmac Studio and you can check the actual slave revisions from the Sysmac Studio or on slave nameplates.
- After you transfer the user program, the CPU Unit is restarted and communications with the EtherCAT slaves are cut off. During that period, the slave outputs behave according to the slave settings.

The time that communications are cut off depends on the EtherCAT network configuration.
Before you transfer the user program, confirm that the system will not be adversely affected.

- EtherCAT communications are not always established immediately after the power supply is turned ON. Use the system-defined variables in the user program to confirm that communications are established before attempting control operations.
- If frames sent to EtherCAT slaves are lost due to noise or other causes, slave I/O data is not communicated, and the intended operation is sometimes not achieved. Perform the following processing if noise countermeasures are necessary.

  Program the *_EC_InDataInvalid* (Input Data Disable) system-defined variable as an interlock condition in the user program.
  Set the *PDO communications consecutive timeout detection count* setting in the EtherCAT master to at least 2.
  Refer to the *NJ-series CPU Unit Built-in EtherCAT Port User's Manual* (Cat. No. W505) for details.
- When an EtherCAT slave is disconnected, communications will stop and control of the outputs will be lost not only for the disconnected slave, but for all slaves connected after it. Confirm that the system will not be adversely affected before you disconnect a slave.
- If you disconnect the cable from an EtherCAT slave to disconnect it from the network, any current communications frames may be lost. If frames are lost, slave I/O data is not communicated, and the intended operation is sometimes not achieved. Perform the following processing for a slave that needs to be replaced.

  Program the *_EC_InDataInvalid* (Input Data Disable) system-defined variable as an interlock condition in the user program.
  Set the *PDO communications consecutive timeout detection count* setting in the EtherCAT master to at least 2.
  Refer to the *NJ-series CPU Unit Built-in EtherCAT Port User's Manual* (Cat. No. W505) for details.

Unit Replacement

- When you replace a Unit, start operation only after you transfer the settings and variables that are required for operation to the new Unit.

Disposal

- Dispose of the product according to local ordinances as they apply.

Precautions for Correct Use

Storage, Mounting, and Wiring

- Follow the instructions in this manual to correctly perform installation.
- Do not operate or store the Units in the following locations. Doing so may result in malfunction, in operation stopping, or in burning.

  Locations subject to direct sunlight
  Locations subject to temperatures or humidity outside the range specified in the specifications
  Locations subject to condensation as the result of severe changes in temperature
  Locations subject to corrosive or flammable gases
  Locations subject to dust (especially iron dust) or salts
  Locations subject to exposure to water, oil, or chemicals
  Locations subject to shock or vibration
- Take appropriate and sufficient countermeasures during installation in the following locations.

  Locations subject to strong, high-frequency noise
  Locations subject to static electricity or other forms of noise
  Locations subject to strong electromagnetic fields
  Locations subject to possible exposure to radioactivity
  Locations close to power lines
- Before touching a Unit, be sure to first touch a grounded metallic object in order to discharge any static build-up.
- Use the rated power supply voltage for the Units that supply power. Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied in places where the power supply is unstable.
- Install the Units away from sources of heat and ensure proper ventilation. Not doing so may result in malfunction, in operation stopping, or in burning.
- Do not allow foreign matter to enter the openings in the Unit. Doing so may result in Unit burning, electric shock, or failure.
- Use the EtherCAT connection methods and applicable cables that are specified in this manual and in the *NJ-series CPU Unit Built-in EtherCAT Port User's Manual* (Cat. No. W505). Otherwise, communications may be faulty.

Actual Operation

- If you change the event level of an error, the output status when the error occurs may also change. Confirm safety before you change an event level.

Turning OFF the Power Supply

- Do not turn OFF the power supply while data is being transferred.
- Do not turn OFF the power supply while parameters are being written to the Communications Coupler Unit or NX Units.

EtherCAT Communications

- Do not disconnect the EtherCAT communications cables during operation. The outputs will become unstable. However, for the built-in EtherCAT port on the NJ-series CPU Unit, it is OK to disconnect the communications cable from an EtherCAT Slave Terminal that has been disconnected from communications in the software.

Regulations and Standards

Conformance to EC Directives

Applicable Directives

- EMC Directives
- Low Voltage Directive

Concepts

● EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards.*1

Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer. EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed. The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

*1. Applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic Susceptibility): EN 61131-2
EMI (Electromagnetic Interference): EN 61131-2 (Radiated emission: 10-m regulations).

● Low Voltage Directive

Always ensure that devices operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC meet the required safety standards. The applicable directive is EN 61131-2.

● Conformance to EC Directives

The NX-series Units comply with EC Directives. To ensure that the machine or device in which the NX-series Units are used complies with EC Directives, the following precautions must be observed.

- The NX-series Units must be installed within a control panel.
- You must use reinforced insulation or double insulation for the DC power supplies that are connected as the Unit power supplies and I/O power supplies for the NX-series Units.

  We recommend that you use the OMRON S8JX-series Power Supplies. EMC standard compliance was confirmed for the recommended Power Supplies.
- NX-series Units that comply with EC Directives also conform to the Common Emission Standard (EN 61131-2). Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions.

  You must therefore confirm that the overall machine or equipment in which the NX-series Units are used complies with EC Directives.
- You must use power supplies with an output hold time of 10 ms or longer for the DC power supplies that are connected as the Unit power supplies and I/O power supplies for the NX-series Units.
- This is a Class A product (for industrial environments). In a residential environment, it may cause radio interference. If radio interference occurs, the user may be required to take appropriate measures.

Conformance to UL and CSA Standards

Some NX-series products comply with UL and CSA standards. If you use an NX-series product that complies with UL or CSA standards and the machinery or system in which you use the NX-series product must also comply with the standards, refer to the *Instruction Sheet* that is provided with the product. The *Instruction Sheet* provides the application conditions for complying with the standards.

Conformance to Shipbuilding Standards

Some NX-series products comply with shipbuilding standards. If you use an NX-series product that complies with shipbuilding standards and the machinery or system in which you use the NX-series product must also comply with the standards, consult with your OMRON representative. Application conditions are defined according to the installation location. Application may not be possible for some installation locations.

Usage Conditions for NK and LR Shipbuilding Standards

● Usage Conditions for Locations Other Than the Bridge or Decks

- The EtherCAT Coupler Unit must be installed within a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.

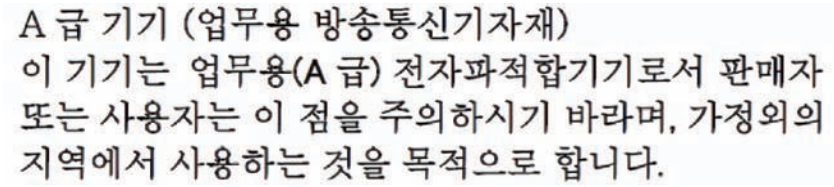
● Usage Conditions for the Bridge (Certified only by Nippon Kaiji Kyokai (Class NK))

- The EtherCAT Coupler Unit must be installed within a control panel.
- Gaps in the door to the control panel must be completely filled or covered with gaskets or other material.
- The following noise filter must be connected to the power supply line.

Name	Manufacturer	Model
Noise filter	Cosel Co., Ltd.	TAH-06-683

Conformance to KC Standards

Observe the following precaution if you use NX-series Units in Korea.


A급 기기 (업무용 방송통신기자재)
이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

Class A Device (Broadcasting Communications Device for Office Use)

This device obtained EMC registration for office use (Class A), and it is intended to be used in places other than homes.

Sellers and/or users need to take note of this.

Software Licenses and Copyrights

This product incorporates certain third party software. The license and copyright information associated with this software is available at http://www.fa.omron.co.jp/nj_info_e/.

Unit Versions

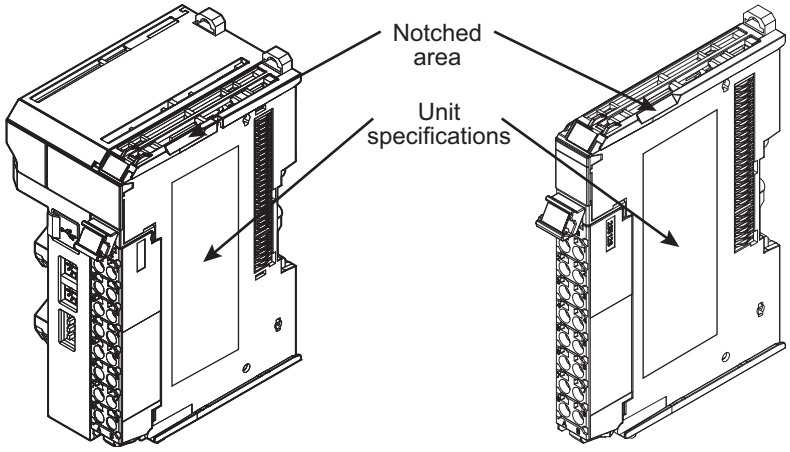
This section describes the notation that is used for unit versions, the confirmation method for unit versions, and the relationship between unit versions and Sysmac Studio versions.

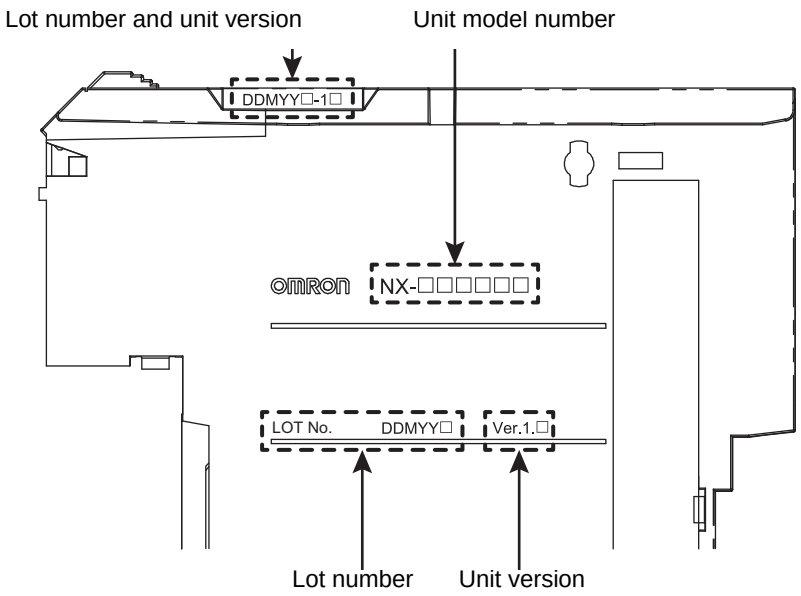
Unit Versions

A “unit version” has been introduced to manage the Units in the NX Series according to differences in functionality accompanying Unit upgrades.

Notation of Unit Versions on Products

The unit version is given with the Unit specifications on the side of the Unit or in the notched area.





The following information is provided in the Unit specifications on the Unit.

Name	Function
Unit model number	Gives the model of the Unit.
Unit version	Gives the unit version of the Unit.
Lot number	Gives the lot number of the Unit. DDMYY□: Lot number, □: Used by OMRON. “M” gives the month (1 to 9: January to September, X: October, Y: November, Z: December)

The following information is provided in the notched area on the Unit.

Name	Function
Lot number and unit version	Gives the lot number and unit version of the Unit. • DDMYY□: Lot number, □: Used by OMRON. “M” gives the month (1 to 9: January to September, X: October, Y: November, Z: December) • 1□: Unit version The decimal portion of the unit version is omitted. (It is provided in the Unit specifications.)

Confirming Unit Versions with the Sysmac Studio

You can use the Unit Production Information on the Sysmac Studio to check the unit versions EtherCAT Coupler Unit and NX Units.

1 Double-click **EtherCAT** under **Configurations and Setup** in the Multiview Explorer, and then double-click the EtherCAT Coupler Unit. Or, right-click the EtherCAT Coupler Unit and select ***Edit*** from the menu.
The Edit Slave Terminal Configuration Tab Page is displayed.

You can also display the Edit Slave Terminal Configuration Tab Page with any of the following operations.

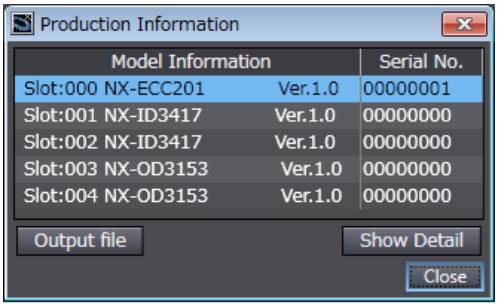
Double-click **EtherCAT** under **Configurations and Setup** in the Multiview Explorer, right-click the EtherCAT Coupler Unit in the EtherCAT Configuration Edit Tab Page, and select ***Edit Slave Terminal Configuration***.

Or, select the EtherCAT Coupler Unit on the EtherCAT Configuration Edit Tab Page click the **Edit Slave Terminal Configuration** Button.

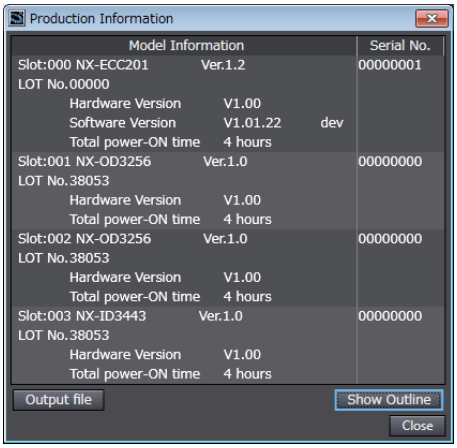
2 Go online.

3 Right-click the EtherCAT Coupler Unit and select ***Display Production Information*** from the menu.

The Production Information Dialog Box is displayed.



Simple Display



Detailed Display

In this example, “Ver.1.0” is displayed next to the Unit model.

The following items are displayed.

- Slot number
- Unit model number
- Unit version
- Serial number
- Lot number

- Hardware version
- Software version
- Total power-ON time

The software version is displayed only for Units that contain software.

Version Information

The total power-ON time is provided by function to monitor the total power-ON time. The function to monitor the total power-ON time was added for a version upgrade. Refer to the *EtherCAT Coupler Unit User's Manual* (Cat. No. W519-E1-03 or later) for the versions that support monitoring the total power-ON time.

Unit Versions and Sysmac Studio Versions

The functions that are supported depend on the unit version of the Unit. The version of Sysmac Studio that supports the functions that were added for an upgrade is also required to use those functions.

Refer to *A-5 Version Information* on page A-20 for the functions that are supported by each unit version.

Unit Version Notation

In this User's Manual, unit versions are specified as shown in the following table.

Unit version in Unit specifications on the product	Notation in this manual	Remarks
Unit version 1.0 or later	Ver. 1.□ or later	Unless unit versions are specified, the information in this manual applies to all unit versions.

Related Manuals

The following manuals are related to the NJ-series Controllers. Use these manuals for reference.

Manual name	Cat. No.	Model numbers	Application	Description
NX-series System Units User's Manual	W523	NX-PD1□□□ NX-PF0□□□ NX-PC0□□□ NX-TBX01	Learning how to use NX-series System Units	The hardware and functions of the NX-series System Units are described.
NX-series Data Reference Manual	W525	NX-□□□□□□	Referencing lists of the data that is required to configure systems with NX-series Units	Lists of the power consumptions, weights, and other NX Unit data that is required to configure systems with NX-series Units are provided.
NX-series Digital I/O Units User's Manual	W521	NX-ID□□□□ NX-IA□□□□ NX-OC□□□□ NX-OD□□□□	Learning how to use NX-series Digital I/O Units	The hardware, setup methods, and functions of the NX-series Digital I/O Units are described.
NX-series Analog I/O Units User's Manual	W522	NX-AD□□□□ NX-DA□□□□ NX-TS□□□□	Learning how to use NX-series Analog I/O Units and Temperature Input Units	The hardware, setup methods, and functions of the NX-series Analog I/O Units and Temperature Input Units are described.
NX-series Position Interface Units User's Manual	W524	NX-EC0□□□ NX-ECS□□□ NX-PG0□□□	Learning how to use NX-series Position Interface Units	The hardware, setup methods, and functions of the NX-series Incremental Encoder Input Units, SSI Input Units, and Pulse Output Unit are described.
NX-series Safety Control Unit User's Manual	Z930	NX-SL□□□□ NX-SI□□□□ NX-SO□□□□	Learning how to use NX-series Safety Control Units	The hardware, setup methods, and functions of the NX-series Safety Control Units are described.
NX-series Safety Control Unit Instructions Reference Manual	Z931	NX-SL□□□□	Learning about the specifications of instructions for the Safety CPU Unit.	The instructions for the Safety CPU Unit are described. When programming, use this manual together with the *NX-series Safety Control Unit User's Manual* (Cat. No. Z930).
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC-SE2□□□	Learning about the operating procedures and functions of the Sysmac Studio.	Describes the operating procedures of the Sysmac Studio.
NJ-series Troubleshooting Manual	W503	NJ501-□□□□ NJ301-□□□□	Learning about the errors that may be detected in an NJ-series Controller.	Concepts on managing errors that may be detected in an NJ-series Controller and information on individual errors are described. Use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) and *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).

Manual name	Cat. No.	Model numbers	Application	Description
NX-series EtherCAT® Coupler Unit User's Manual	W519	NX-ECC201 NX-ECC202	Leaning how to use an NX-series EtherCAT Coupler Unit and EtherCAT Slave Terminals	The following items are described: the overall system and configuration methods of an EtherCAT Slave Terminal (which consists of an NX-series EtherCAT Coupler Unit and NX Units), and information on hardware, setup, and functions to set up, control, and monitor NX Units through EtherCAT.
NJ-series CPU Unit Hardware User´s Manual	W500	NJ501-□□□□ NJ301-□□□□	Learning the basic specifications of the NJ-series CPU Units, including introductory information, designing, installation, and maintenance. Mainly hardware information is provided.	An introduction to the entire NJ-series system is provided along with the following information on the CPU Unit. • Features and system configuration • Overview • Part names and functions • General specifications • Installation and wiring • Maintenance and Inspection Use this manual together with the *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).
NJ-series CPU Unit Software User's Manual	W501	NJ501-□□□□ NJ301-□□□□	Learning how to program and set up an NJ-series CPU Unit. Mainly software information is provided.	The following information is provided on an NJ-series CPU Unit. • CPU Unit operation • CPU Unit features • Initial settings • Programming based on IEC 61131-3 language specifications Use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500).
NJ-series CPU Unit Built-in EtherCAT® Port User's Manual	W505	NJ501-□□□□ NJ301-□□□□	Using the built-in EtherCAT port on an NJ-series CPU Unit.	Information on the built-in EtherCAT port is provided. This manual provides an introduction and provides information on the configuration, features, and setup. Use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) and *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).
NJ-series CPU Unit Motion Control User's Manual	W507	NJ501-□□□□ NJ301-□□□□	Learning about motion control settings and programming concepts.	The settings and operation of the CPU Unit and programming concepts for motion control are described. When programming, use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) and *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).

Manual name	Cat. No.	Model numbers	Application	Description
NJ-series Instructions Reference Manual	W502	NJ501-□□□□ NJ301-□□□□	Learning detailed specifications on the basic instructions of an NJ-series CPU Unit.	The instructions in the instruction set (IEC 61131-3 specifications) are described. When programming, use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500) and *NJ-series CPU Unit Software User's Manual* (Cat. No. W501).
NJ-series Motion Control Instructions Reference Manual	W508	NJ501-□□□□ NJ301-□□□□	Learning about the specifications of the motion control instructions.	The motion control instructions are described. When programming, use this manual together with the *NJ-series CPU Unit Hardware User's Manual* (Cat. No. W500), *NJ-series CPU Unit Software User's Manual* (Cat. No. W501) and *NJ-series CPU Unit Motion Control User's Manual* (Cat. No. W507).

Terminology

Term	Abbre-viation	Description
application layer status, AL status	---	Status for indicating information on errors that occur in an application on a slave.
CAN application protocol over Ether-CAT	CoE	A CAN application protocol service implemented on EtherCAT.
CAN in Automation	CiA	CiA is the international users' and manufacturers' group that develops and supports higher-layer protocols.
Communications Coupler Units	---	The generic name of an interface unit for remote I/O communications on a network between NX Units and a host network master.
DC time	---	EtherCAT slaves that support distributed clock synchronization have a clock that is shared by all slaves in the network. The time that is based on this distributed clock is called the DC time.
device profile	---	A collection of device dependent information and functionality providing consistency between similar devices of the same device type.
device variable	---	A variable in the NJ-series CPU Unit to which process data on an Ether-CAT slave is allocated. Slave process data is accessed by directly read-ing and writing device variables from user applications on the NJ-series CPU Unit.
distributed clock	DC	Clock distribution mechanism used to synchronize EtherCAT slaves and the EtherCAT master.
EtherCAT slave controller	ESC	A controller for EtherCAT slave communications.
EtherCAT slave information	ESI	An XML file that contains setting information for an EtherCAT slave.
EtherCAT state machine	ESM	An EtherCAT communications state machine.
EtherCAT Technology Group	ETG	The ETG is a global organization in which OEM, end users, and technol-ogy providers join forces to support and promote the further technology development.
I/O map settings	---	Settings that assign variables to I/O ports. Assignment information between I/O ports and variables.
I/O port	---	A logical interface that is used by the CPU Unit to exchange data with an external device (slave or Unit).
I/O refreshing	---	Cyclic data exchange with external devices that is performed with prede-termined memory addresses.
index	---	Address of an object within an application process.
network configuration information	---	The EtherCAT network configuration information held by the EtherCAT master.
NX bus	---	The NX-series internal bus.
object	---	An abstract representation of a particular component within a device, which consists of data, parameters, and methods.
object dictionary	OD	Data structure that contains description of data type objects, communi-cation objects and application objects.
Operational	---	A state in EtherCAT communications where SDO communications and I/O are possible.
PDO communications	---	An acronym for process data communications.
Pre-Operational	---	A state in EtherCAT communications where only SDO communications are possible with the slaves, i.e., no I/O can be performed.
primary periodic task	---	The task with the highest priority.
process data	---	Collection of application objects designated to be downloaded cyclically or acyclically for the purpose of measurement and control.
process data communications	---	One type of EtherCAT communications in which process data objects (PDOs) are used to exchange information cyclically and in realtime. This is also called PDO communications.

Term	Abbreviation	Description
process data object	PDO	A structure that describes the mappings of parameters that have one or more process data entities.
receive PDO	RxPDO	A process data object received by an EtherCAT slave.
Safe-Operational	---	A state in EtherCAT communications where only SDO communications and reading input data from slaves are possible. Outputs from slaves are not performed.
SDO communications	---	One type of EtherCAT communications in which service data objects (SDOs) are used to transmit information whenever required.
service data object	SDO	CoE asynchronous mailbox communications where all objects in the object dictionary can be read and written.
Slave Information Interface	SII	Slave information that is stored in non-volatile memory in the slave.
Slave Terminal	---	A building-block remote I/O terminal to which a Communications Coupler Unit and NX Units are mounted
subindex	---	Sub-address of an object within the object dictionary.
Sync0	---	A signal that gives the interrupt timing based on the distributed clock (DC) in EtherCAT communications. The slaves execute controls according to this interrupt timing.
Sync Manager	SM	Collection of control elements to coordinate access to concurrently used objects.
task period	---	The interval at which the primary periodic task or a periodic task is executed.
transmit PDO	TxPDO	A process data object sent from an EtherCAT slave.

Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.

Revision code	Date	Revised content
01	April 2013	Original production
02	June 2013	Corrected mistakes
03	September 2013	Added information on the NX-PF0730 and corrected mistakes.

Sections in this Manual

1 Features and System Configuration
2 Specifications
3 Part Names and Functions
4 Installation and Wiring
5 Troubleshooting
6 Inspection and Maintenance
A Appendices
I Index

1

Features and System Configuration

This section describes NX system configuration and System Unit types.

1-1 Features and Types of System Units 1-2
1-1-1 System Unit Features 1-2
1-1-2 System Unit Types 1-2
1-2 System Configuration of Slave Terminals 1-3
1-2-1 Overview 1-3
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1-3 Model List 1-5
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1-3-2 Additional NX Unit Power Supply Unit 1-6
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1-3-5 Shield Connection Unit 1-7
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1-1 Features and Types of System Units

This section describes features and types of System Units.

1-1-1 System Unit Features

System Units are Units used to build the system for separating power supply systems or supplying power in the midstream in a Slave Terminal.

The NX-series System Units provide the following features.

Simple I/O Wiring with a Screwless Clamping Terminal Block

The terminal block is a screwless clamping terminal block.

You can connect the wires simply by pushing the ferrules into the terminals. The amount of wiring work is reduced without requiring the use of screws.

1-1-2 System Unit Types

The types of System Units are as follows.

Type		Purpose
System Units		These Units are used as required to build a Slave Terminal.
	Additional NX Unit Power Supply Unit	This Unit is used when the NX Unit power supply is insufficient.
	Additional I/O Power Supply Unit	This Unit is used when the I/O power supply is insufficient or to separate the I/O power supply in the Slave Terminal.
	I/O Power Supply Connection Unit	This Unit is used when the I/O power supply terminals are insufficient for connections to external I/O devices.
	Shield Connection Unit	This Unit is used to ground more than one shield from external I/O connections to the same ground.

Refer to *1-3 Model List* on page 1-5 for details on System Unit models.

1-2 System Configuration of Slave Terminals

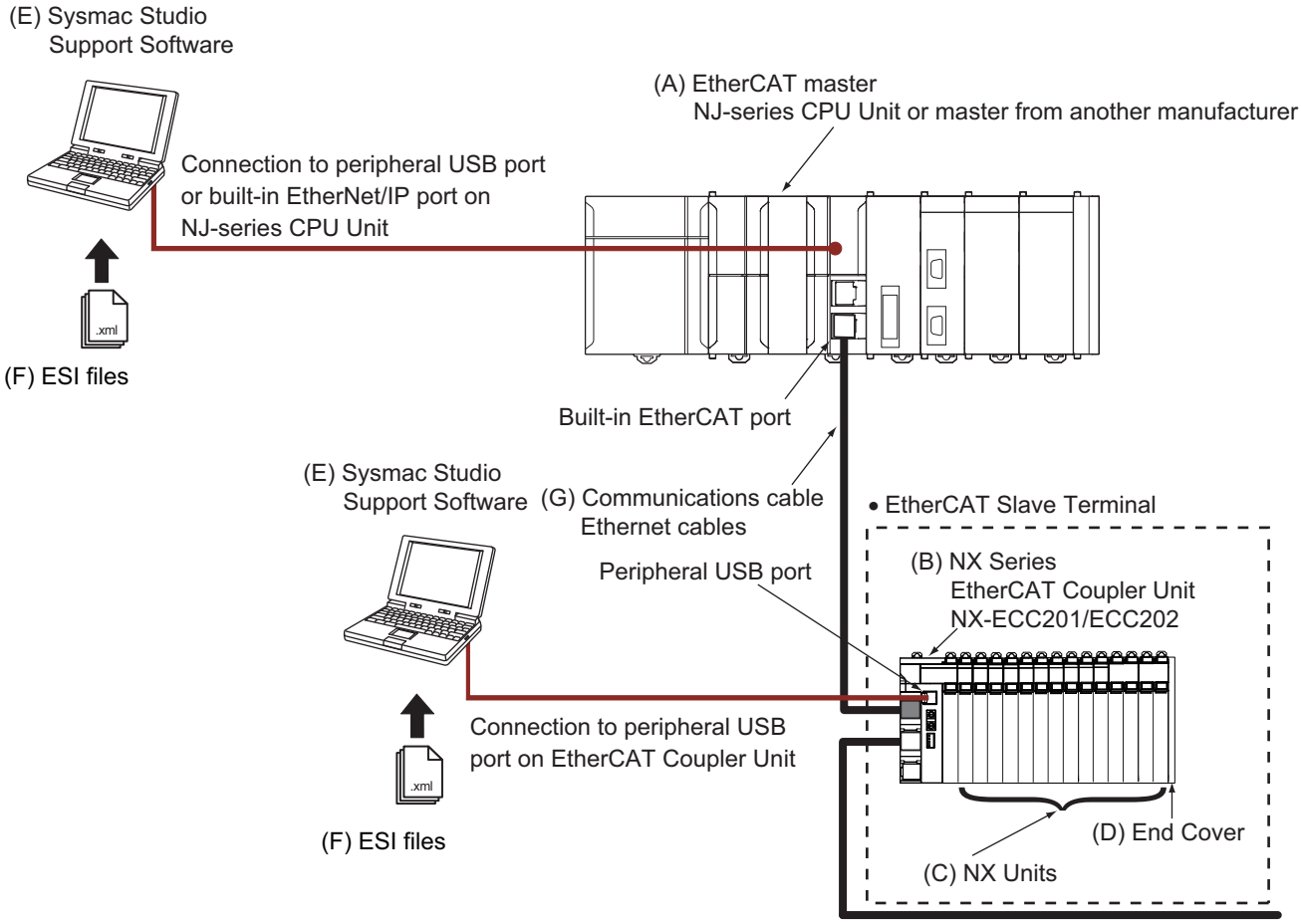
1-2-1 Overview

The Slave Terminal is a building-block remote I/O slave that is created by mounting a group of NX Units to a Communications Coupler Unit.

The NX Units can be flexibly combined with a Communications Coupler Unit to achieve the optimum remote I/O slave for the application with less wiring, less work, and less space.

1-2-2 System Configuration

The following figure shows an example of the system configuration when an EtherCAT Coupler Unit is used as a Communications Coupler Unit.



Letter	Item	Description
(A)	EtherCAT master *1	The EtherCAT master manages the network, monitors the status of slaves, and exchanges I/O data with slaves.
(B)	EtherCAT Coupler Unit	The EtherCAT Coupler Unit serves as an interface for process data communications on the EtherCAT network between the NX Units and the EtherCAT master. The I/O data for the NX Units is accumulated in the EtherCAT Coupler Unit and then all of the data is exchanged with the EtherCAT master at the same time. The EtherCAT Coupler Unit can also perform message communications (SDO communications) with the EtherCAT master.
(C)	NX Units	The NX Units perform I/O processing with connected external devices. The NX Units perform process data communications with the EtherCAT master through the EtherCAT Coupler Unit.
(D)	End Cover	The End Cover is attached to the end of the Slave Terminal.
(E)	Sysmac Studio Support Software	The Sysmac Studio runs on a personal computer and it is used to configure the EtherCAT network and EtherCAT Slave Terminal, and to program, monitor, and troubleshoot the Controllers. You can connect the computer, in which the Sysmac Studio is installed, to the peripheral USB port or built-in EtherNet/IP port on an NJ-series CPU Unit to set up the EtherCAT Slave Terminal. Or you can connect it to the peripheral USB port on the EtherCAT Coupler Unit to set up the EtherCAT Slave Terminal.
(F)	ESI (EtherCAT Slave Information) file	The ESI file contains information that is unique to the EtherCAT Slave Terminal in XML format. You can load the ESI file into the Sysmac Studio to easily allocate Slave Terminal process data and configure other settings. The ESI files for OMRON EtherCAT slaves are already installed in the Sysmac Studio. You can update the Sysmac Studio to get the ESI files for the most recent models.
(G)	Communications cable	Use a double-shielded cable with aluminum tape and braiding of Ethernet category 5 (100Base-TX) or higher, and use straight wiring.

*1. An EtherCAT Slave Terminal cannot be connected to any of the OMRON CJ1W-NC□81/□82 Position Control Units even though they can operate as EtherCAT masters.

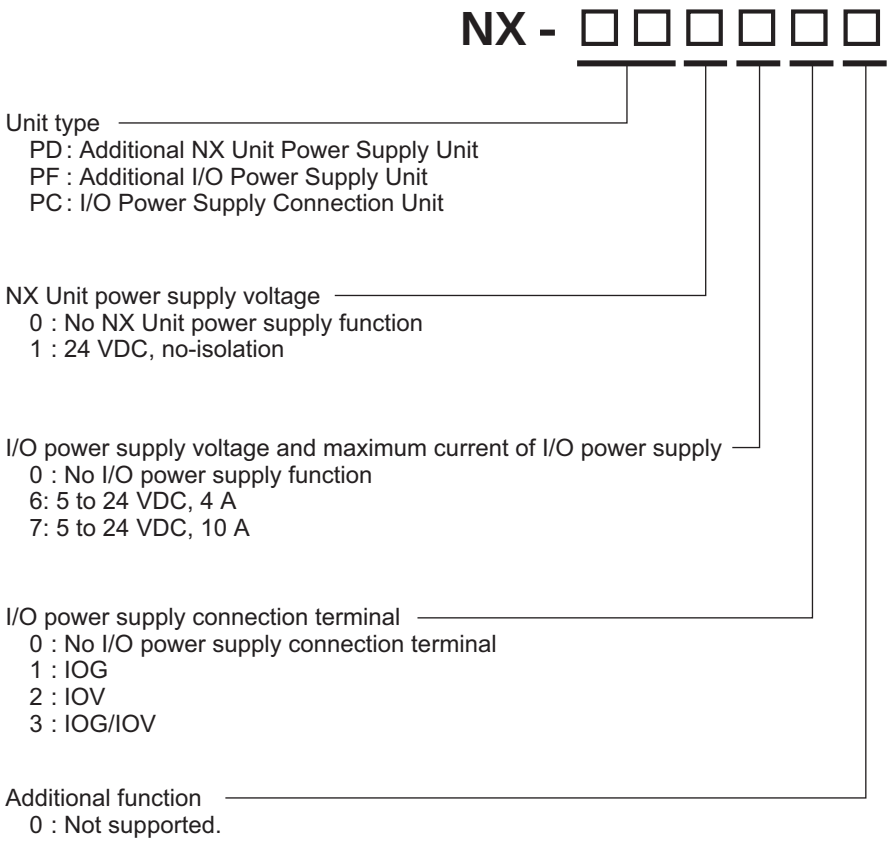
1-3 Model List

1-3-1 Model Notation

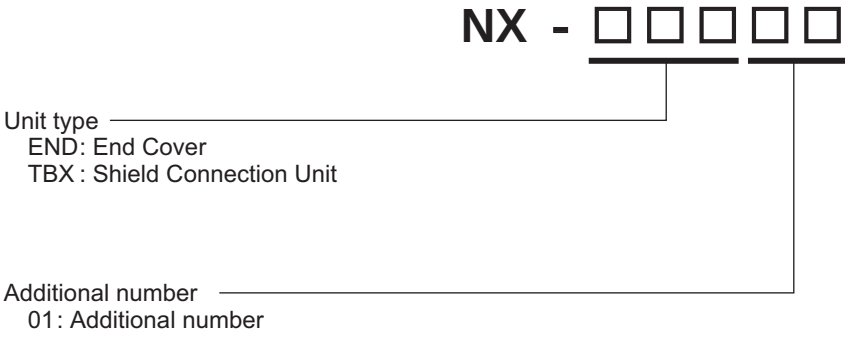
The System Unit models are assigned based on the following rules.

Model notation for the power supply-related Units (Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit and I/O Power Supply Connection Unit) differs from that of System Units other than power supply-related Units.

Power Supply-related Units


NX - □□□□□□
Unit type
PD : Additional NX Unit Power Supply Unit
PF : Additional I/O Power Supply Unit
PC : I/O Power Supply Connection Unit
NX Unit power supply voltage
0 : No NX Unit power supply function
1 : 24 VDC, no-isolation
I/O power supply voltage and maximum current of I/O power supply
0 : No I/O power supply function
6: 5 to 24 VDC, 4 A
7: 5 to 24 VDC, 10 A
I/O power supply connection terminal
0 : No I/O power supply connection terminal
1 : IOG
2 : IOV
3 : IOG/IOV
Additional function
0 : Not supported.

System Units Other Than Power Supply-related Units



1-3-2 Additional NX Unit Power Supply Unit

This section shows a list of Additional NX Unit Power Supply Units.

Refer to *A-1-2 Additional NX Unit Power Supply Unit* on page A-3 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Rated power supply voltage	NX Unit power supply capacity	Reference
NX-PD1000	24 VDC	10 W max.	P. A-4

1-3-3 Additional I/O Power Supply Unit

This section shows a list of Additional I/O Power Supply Units.

Refer to *A-1-3 Additional I/O Power Supply Unit* on page A-6 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Rated power supply voltage	Maximum current of I/O power supply	Reference
NX-PF0630	5 to 24 VDC	4 A	P. A-7
NX-PF0730	5 to 24 VDC	10 A	P. A-8

1-3-4 I/O Power Supply Connection Unit

This section shows a list of I/O Power Supply Connection Units.

Refer to *A-1-4 I/O Power Supply Connection Unit* on page A-9 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Number of I/O power supply terminals	Current capacity of I/O power supply terminal	Reference
NX-PC0020	IOV: 16 terminals	4 A/terminal max.	P. A-10
NX-PC0010	IOG: 16 terminals		P. A-11
NX-PC0030	IOV: 8 terminals IOG: 8 terminals		P. A-12

1-3-5 Shield Connection Unit

This section shows a list of Shield Connection Units.

Refer to *A-1-5 Shield Connection Unit* on page A-13 for details.

Screwless Clamping Terminal Block, 12 mm Width

Model	Number of shield terminals	Reference
NX-TBX01	14 terminals (The following two terminals are functional ground terminals.)	P. A-14

1-4 Support Software

The following table shows the Support Software that can perform the settings of the Slave Terminal.

1-4-1 Applicable Support Software

Support Software	Version
Sysmac Studio	Ver. 1.06 or higher

Note Refer to *A-5 Version Information* on page A-20 for information on the versions that are supported for each NX Unit model.

Refer to the user's manual of the Communications Coupler Unit for details on connections.

2

Specifications

This section describes the general specifications and individual specifications of System Units.

2-1 General Specifications 2-2
2-2 Individual Specifications 2-3

2-1 General Specifications

This table shows the general specifications of all System Units.

Item		Specification
Enclosure		Mounted in a panel
Grounding methods		Ground of 100 Ω or less
Operating environment	Ambient operating temperature	0 to 55°C
	Ambient operating humidity	10 to 95% RH (with no icing or condensation)
	Atmosphere	Must be free from corrosive gases.
	Ambient storage temperature	−25 to 70°C (with no icing or condensation)
	Altitude	2,000 m max.
	Pollution degree	Pollution degree 2 or less: Conforms to JIS B3502 and IEC 61131-2.
	Noise immunity	Conforms to IEC61000-4-4, 2 kV (power supply line)
	Overvoltage category	Category II: Conforms to JIS B3502 and IEC 61131-2.
	EMC immunity level	Zone B
	Vibration resistance	Conforms to IEC60068-2-6. 5 to 8.4 Hz with amplitude of 3.5 mm, 8.4 to 150 Hz, acceleration of 9.8 m/s^2 100 min each in X, Y, and Z directions (10 sweeps of 10 min each = 100 min total)
	Shock resistance	Conforms to IEC60068-2-27, 147 m/s^2, 3 times each in X, Y, and Z directions
	Insulation resistance	*1
	Dielectric strength	*1
Applicable standards*2		cULus: Listed (UL508), ANSI/ISA 12.12.01, EC: EN61131-2, C-Tick, KC: KC Registration, NK, LR

*1. Varies with NX Unit Models. Refer to *A-1 Data Sheet* on page A-2 for the specifications of NX Units.

*2. Refer to the OMRON website (www.ia.omron.com) or ask your OMRON representative for the most recent applicable standards for each model.

2-2 Individual Specifications

Refer to *A-1 Data Sheet* on page A-2 for the specifications of individual System Units.

3

Part Names and Functions

This section describes the names and functions of the System Unit parts.

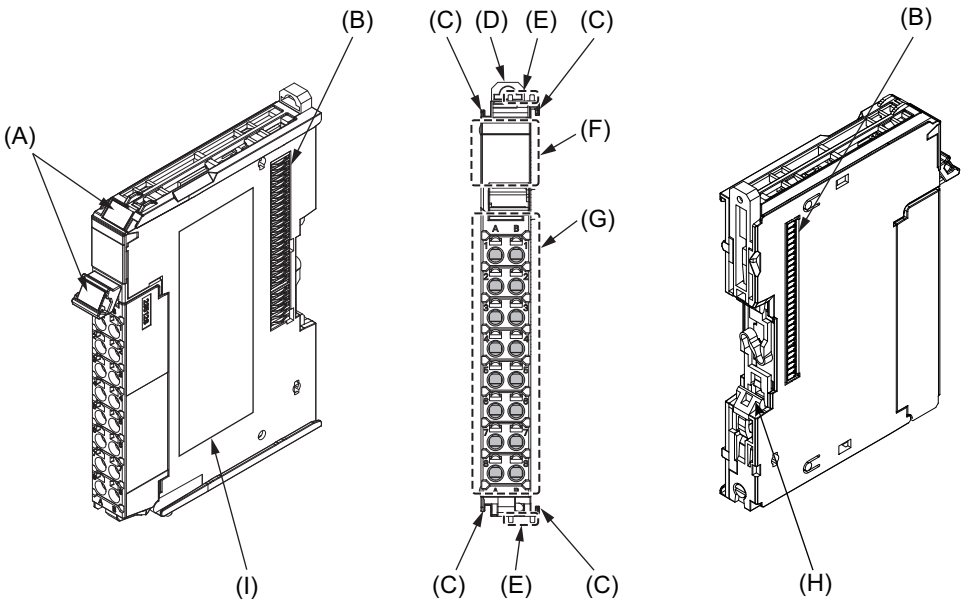
3-1 Names of Power Supply-related Unit Parts 3-2
3-1-1 Screwless Clamping Terminal Block Type 3-2
3-1-2 Indicators 3-6
3-2 Names of Shield Connection Unit Parts 3-9
3-2-1 Screwless Clamping Terminal Block Type 3-9
3-2-2 Indicators 3-12

3-1 Names of Power Supply-related Unit Parts

This section describes the names and functions of power supply-related Unit parts (Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, and I/O Power Supply Connection Unit).

3-1-1 Screwless Clamping Terminal Block Type

NX Units (12 mm Width)

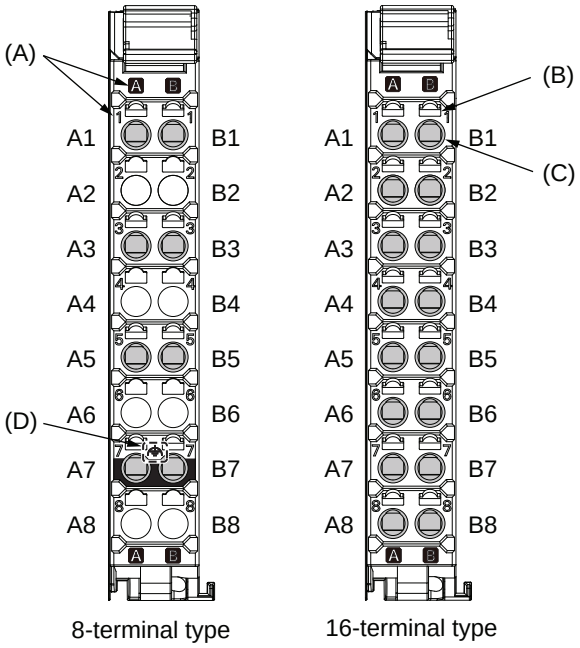


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed. Refer to *4-1-2 Attaching Markers* on page 4-4
(B)	NX bus connector	This connector is used to connect each Unit.
(C)	Unit hookup guides	These guides are used to connect two Units.
(D)	DIN Track mounting hooks	These hooks are used to mount the NX Unit to a DIN Track.
(E)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(F)	Indicators	The indicators show the current operating status of the Unit. Refer to *3-1-2 Indicators* on page 3-6
(G)	Terminal block	The terminal block is used to connect external devices. The number of terminals depends on the type of Unit.
(H)	DIN Track contact plate	This plate is used to contact the ground terminal with a DIN Track. It is only on the Units that have ground terminals.
(I)	Unit specifications	The specifications of the Unit are given.

Terminal Blocks

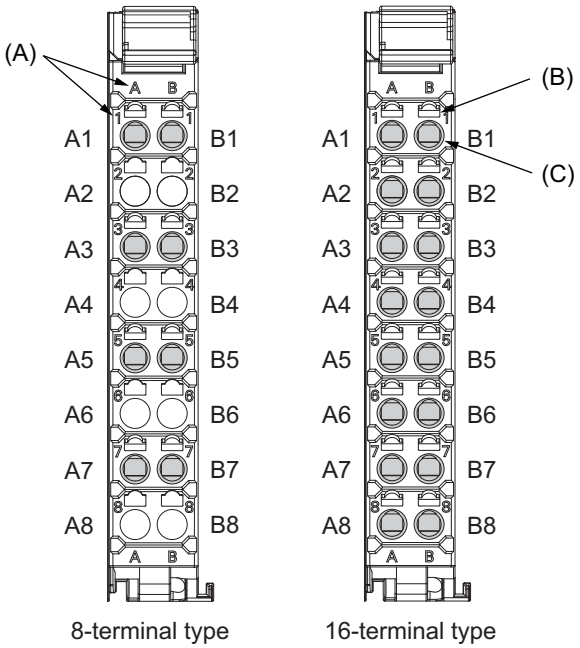
There are two models of Screwless Clamping Terminal Blocks: NX-TB□□□2 and NX-TB□□□1. Each model has three types of terminal blocks: 8-terminal type, 12-terminal type, and 16-terminal type. Use the 8-terminal type and the 16-terminal type for the power supply-related Units.

● NX-TB□□□2



8-terminal type　　16-terminal type

● NX-TB□□□1



8-terminal type　　16-terminal type

Letter	Name	Function
(A)	Terminal number indications	Terminal numbers for which A and B indicate the column, and 1 to 8 indicate the line are displayed. The terminal number is a combination of column and line, i.e. A1 to A8 and B1 to B8. The terminal number indications are the same regardless of the number of terminals on the terminal block.
(B)	Release holes	Insert a flat-blade screwdriver into these holes to connect and remove the wires.
(C)	Terminal holes	The wires are inserted into these holes.
(D)	Ground terminal mark	This mark indicates ground terminals. It is only on the NX-TBC□□2.

The NX-TB□□□2 and NX-TB□□□1 Terminal Blocks have different terminal current capacities. The NX-TB□□□2 has 10 A and NX-TB□□□1 has 4 A.

To differentiate between the two models of Terminal Blocks, use the terminal number column indications. The Terminal Block with white letters on a dark background is the NX-TB□□□2.

You can mount either NX-TB□□□1 or NX-TB□□□2 Terminal Blocks to the Units that the current capacity specification of the terminals is 4 A or less.

You can only mount the NX-TB□□□2 Terminal Block to the Units that the current capacity specification of the terminals is greater than 4 A.

Additional Information

- Each power supply-related Unit is compatible with only one of three types of terminal blocks. You cannot use a terminal block with a number of terminals that differs from the specifications for a particular Unit.
- The 8-terminal type does not have terminal holes and release holes for following terminal numbers.

  A2, A4, A6, A8, B2, B4, B6, and B8

Applicable Terminal Blocks for Each Unit Model

The following indicates the Terminal Blocks that are applicable to each Unit.

Unit model number	Terminal Block			
	Model	Number of terminals	Ground terminal	Current capacity
NX-PD1000	NX-TBA081	8	Not provided	4 A
	NX-TBC082		Provided	10 A
NX-PF0630	NX-TBA081		Not provided	4 A
	NX-TBA082			10 A
NX-PF0730	NX-TBA082			
NX-PC□□□	NX-TBA161	16		4 A
	NX-TBA162			10 A

Precautions for Correct Use

You can mount either NX-TB□□□1 or NX-TB□□□2 Terminal Blocks to the Units that the current capacity specification of the terminals is 4 A or less.

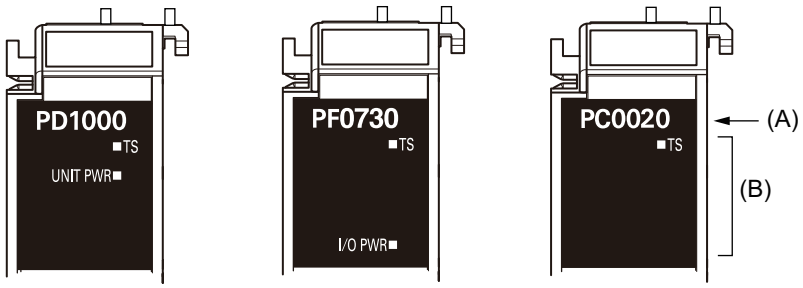
However, even if you mount the NX-TB□□□2 Terminal Block, the current specification does not change because the current capacity specification of the terminals on the Units is 4 A or less.

Refer to *A-4 List of Terminal Block Models* on page A-19 for information on the models of Terminal Blocks.

3-1-2 Indicators

There are the indicators to show the current operating status of the NX Unit on the Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, and I/O Power Supply Connection Unit.

The following indicator patterns are available depending on the Unit types.

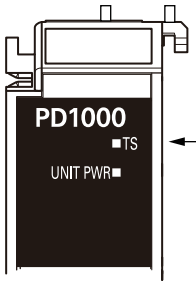


Additional NX Unit Power Supply Unit | Additional I/O Power Supply Unit | I/O Power Supply Connection Unit

Letter	Name	Function
(A)	Model number indications	The model numbers of the NX Unit are displayed. Example: "PD1000" in the case of NX-PD1000
(B)	Indicators	The indicator shows the current operating status of the NX Unit.

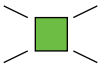
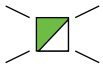
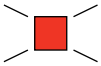
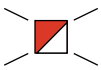
The following section describes the specifications of each indicator.

TS Indicator



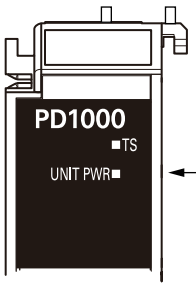
This indicator shows the current status of the Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, or I/O Power Supply Connection Unit and its communications status with the Communications Coupler Unit.

The meanings of light statuses are described as follows:

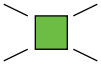
Color	Status		Description
Green		Lit	The Unit is operating normally. The Unit is ready for I/O refreshing.
		Flashing at 2-s intervals.	• Initializing • Restarting is in progress for the Unit. • Downloading
Red		Lit	A hardware failure, WDT error, or other fatal error that is common to all I/O Units occurred.
		Flashing at 1-s intervals.	A communications error or other NX bus-related error that is common to all I/O Units occurred.
–		Not lit	• No Unit power supply • Restarting is in progress for the Slave Terminal. • Waiting for initialization to start

UNIT PWR Indicator

This is mounted only on an Additional NX Unit Power Supply Unit.

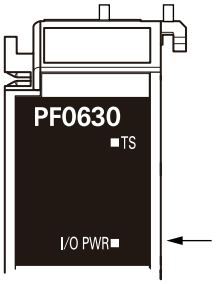


This indicator shows the NX Unit power status of an Additional NX Unit Power Supply Unit.

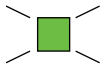
Color	Status		Description
Green		Lit	The Unit power is supplied.
		Not lit	The Unit power is not supplied.

● I/O PWR Indicator

This is mounted only on the Additional I/O Power Supply Unit.



This indicator shows the I/O power supply status of an Additional I/O Power Supply Unit.

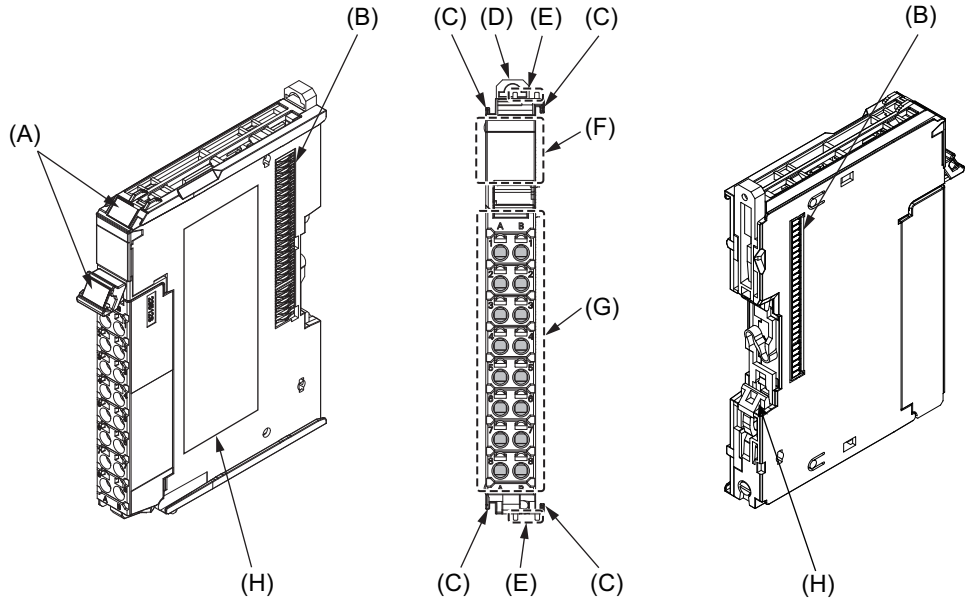
Color	Status		Description
Green		Lit	The I/O power is supplied.
		Not lit	The I/O power is not supplied.

3-2 Names of Shield Connection Unit Parts

This section describes the names and functions of the Shield Connection Unit parts.

3-2-1 Screwless Clamping Terminal Block Type

NX Units (12 mm Width)

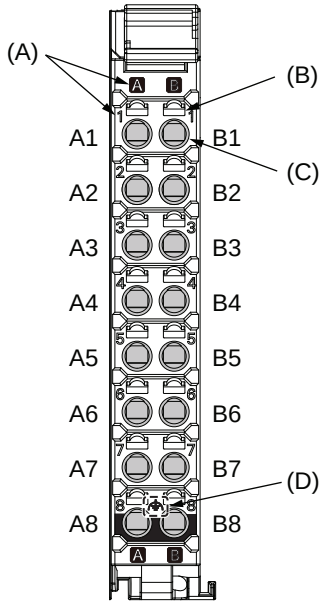


Letter	Name	Function
(A)	Marker attachment locations	The locations where markers are attached. The markers made by OMRON are installed for the factory setting. Commercially available markers can also be installed. Refer to *4-1-2 Attaching Markers* on page 4-4
(B)	NX bus connector	This connector is used to connect each Unit.
(C)	Unit hookup guides	These guides are used to connect two Units.
(D)	DIN Track mounting hooks	These hooks are used to mount the NX Unit to a DIN Track.
(E)	Protrusions for removing the Unit	The protrusions to hold when removing the Unit.
(F)	Indicators	The indicators show the current operating status of the Unit. Refer to *3-2-2 Indicators* on page 3-12
(G)	Terminal block	The terminal block is used to connect external devices. The number of terminals depends on the type of Unit.
(H)	DIN Track contact plate	This plate is used to contact the ground terminal with a DIN Track. It is only on the Units that have ground terminals.
(I)	Unit specifications	The specifications of the Unit are given.

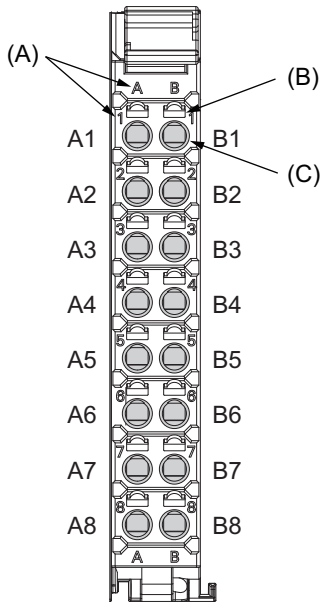
Terminal Blocks

There are two models of Screwless Clamping Terminal Blocks: NX-TB□□□2 and NX-TB□□□1. Each model has three types of terminal blocks: 8-terminal type, 12-terminal type, and 16-terminal type. Use the 16-terminal type for the Shield Connection Unit.

- **NX-TBC162**



- **NX-TBA161**



Letter	Name	Description
(A)	Terminal number indications	Terminal numbers for which A and B indicate the column, and 1 to 8 indicate the line are displayed. The terminal number is a combination of column and line, i.e. A1 to A8 and B1 to B8.
(B)	Release holes	Insert a flat-blade screwdriver into these holes to connect and remove the wires.
(C)	Terminal holes	The wires are inserted into these holes.
(D)	Ground terminal mark	This mark indicates ground terminals. It is only on the NX-TBC□□2.

The NX-TB□□□2 and NX-TB□□□1 Terminal Blocks have different terminal current capacities. The NX-TB□□□2 has 10 A and NX-TB□□□1 has 4 A.

To differentiate between the two models of Terminal Blocks, use the terminal number column indications. The Terminal Block with white letters on a dark background is the NX-TB□□□2.

You can mount either NX-TB□□□1 or NX-TB□□□2 Terminal Blocks to the Shield Connection Unit.

Additional Information

The Shield Connection Unit is only compatible with the 16-terminal type. You cannot use a terminal block with a different number of terminals.

● Applicable Terminal Blocks for Each Unit Model

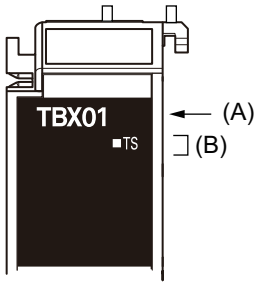
The following indicates the Terminal Blocks that are applicable to each Unit.

Unit model number	Terminal Block			
	Model	Number of terminals	Ground terminal	Current capacity
NX-TBX01	NX-TBA161	16	Not provided	4 A
	NX-TBC162		Provided	10 A

Refer to *A-4 List of Terminal Block Models* on page A-19 for information on the models of Terminal Blocks.

3-2-2 Indicators

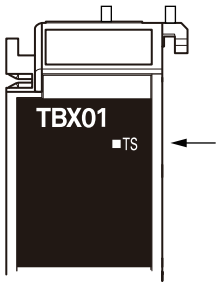
There are the indicators to show the current operating status of the NX Unit on the Shield Connection Unit.



Letter	Name	Description
(A)	Model number indications	The model numbers of the NX Unit are displayed. Example: "TBX01" in the case of NX-TBX01
(B)	TS indicator	The indicator shows the current operating status of the NX Unit.

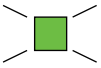
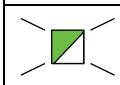
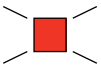
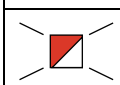
The following section describes the specifications of the TS indicator.

● TS Indicator



This indicator shows the current status of the Shield Connection Unit and its communications status with the Communications Coupler Unit.

The meanings of light statuses are described as follows:

Color	Status		Description
Green		Lit	The Unit is operating normally. The Unit is ready for I/O refreshing.
		Flashing at 2-s intervals.	• Initializing • Restarting is in progress for the Unit. • Downloading
Red		Lit	A hardware failure, WDT error, or other fatal error that is common to all I/O Units occurred.
		Flashing at 1-s intervals.	A communications error or other NX bus-related error that is common to all I/O Units occurred.
–		Not lit	• No Unit power supply • Restarting is in progress for the Slave Terminal. • Waiting for initialization to start

4

Installation and Wiring

This section describes how to install the NX Units, the types of power supplies used in the Slave Terminal, their wiring methods, and how to wire the NX Units.

4-1 Installing NX Units 4-2
4-1-1 Installing NX Units 4-2
4-1-2 Attaching Markers 4-4
4-1-3 Removing NX Units 4-5
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4-2-2 Supplying Each Power Supply and Wiring 4-9
4-2-3 Power Supply-related Units and Wiring Methods 4-11
4-3 Grounding the Slave Terminal 4-14
4-4 Wiring the Additional Power Supply Units 4-15
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4-1 Installing NX Units

This section describes how to install NX Units.

Refer to the user's manual of the Communications Coupler Unit for information on preparations of installation and installation in a control panel.

4-1-1 Installing NX Units

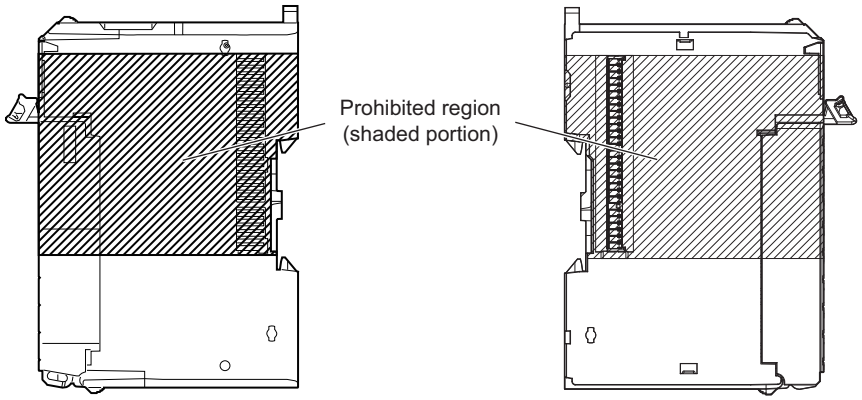
This section describes how to mount two NX Units to each other.

Always turn OFF the power supply before you mount NX Units.

Always mount NX Units one at a time. If you attempt to mount multiple NX Units that are already connected together, the connections between the NX Units may separate from each other and fall.

Precautions for Safe Use

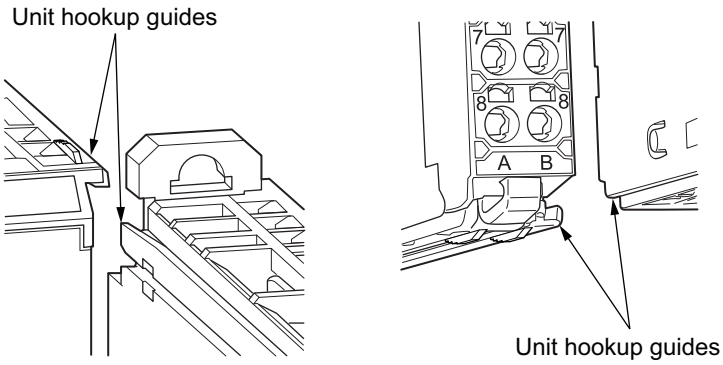
- Do not apply labels or tape on the NX Units. When the Unit is installed or removed, adhesive or scrap may adhere to the pins of the NX bus connector, which may cause malfunctions.
- Do not write with ink or soil within the prohibited region that is shown in the following figure. When the Unit is installed or removed, ink or dirt may adhere to the pins of the NX bus connector, which may cause malfunctions in the Slave Terminal.



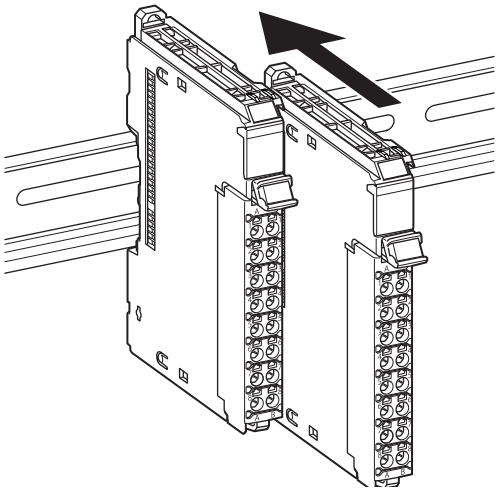
Precautions for Correct Use

- When you install an NX Unit, do not touch or bump the pins in the NX bus connector.
- When you handle an NX Unit, be careful not to apply any stress to the pins in the NX bus connector. If you install an NX Unit and turns ON the power supply when the pins in the NX bus connector are deformed, a contact defect may cause malfunctions.

1 From the front of the previously mounted NX Unit, engage the Unit hookup guides on a new Unit with the Unit hookup guides on the previously mounted NX Unit.



2 Slide the NX Unit in on the hookup guides.



3 Press the NX Unit with a certain amount of force against the DIN Track until you hear the DIN Track mounting hook lock into place.

When you mount the NX Unit, it is not necessary to release the DIN track mounting hook on the NX Unit.

After you mount the NX Unit, make sure that it is locked to the DIN Track.

Additional Information

- Normally, it is not necessary to release the DIN track mounting hook when you mount the NX Unit. However, if you mount the NX Unit on a DIN Track that is not a recommended DIN Track, the DIN track mounting hook may not lock correctly. If that happens, first unlock the DIN track mounting hook, mount the NX Unit to the DIN Track, then lock the DIN track mounting hook.
- Refer to the user's manual of the Communications Coupler Unit for information on how to mount the Communications Coupler Unit, and how to mount the NX Unit to the Communications Coupler Unit.

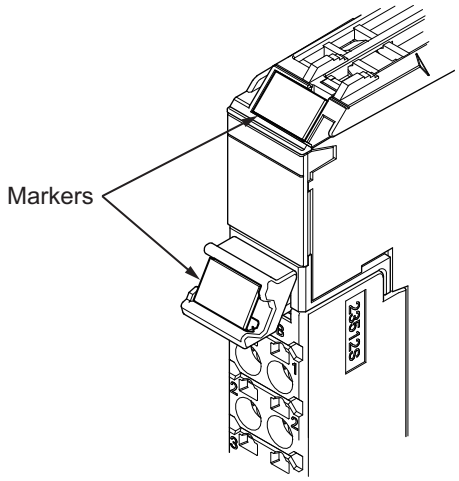
4-1-2 Attaching Markers

Markers can be attached to the NX Units and terminal blocks on NX Units to identify them.

The plastic markers made by OMRON are installed for the factory setting. The ID information can be written on them.

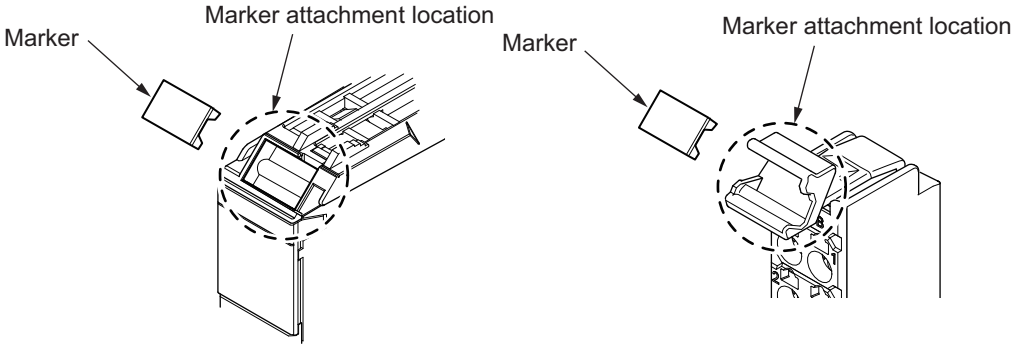
Commercially available markers can also be installed.

Replace the markers made by OMRON if you use commercially available markers now.



● Installation Method

Insert the protrusions on the markers into the marker attachment locations on the NX Units and terminal blocks on NX Units.



<NX Unit> <Terminal Block>

● Commercially Available Markers

Commercially available markers are made of plastic and can be printed on with a special printer.

To use commercially available markers, purchase the following products.

Product name	Model number	
	Manufactured by Phoenix Contact	Manufactured by Weidmuller
Markers	UC1-TMF8	DEK 5/8
Special marker printer	UM EN BLUEMARK X1	PrintJet PRO

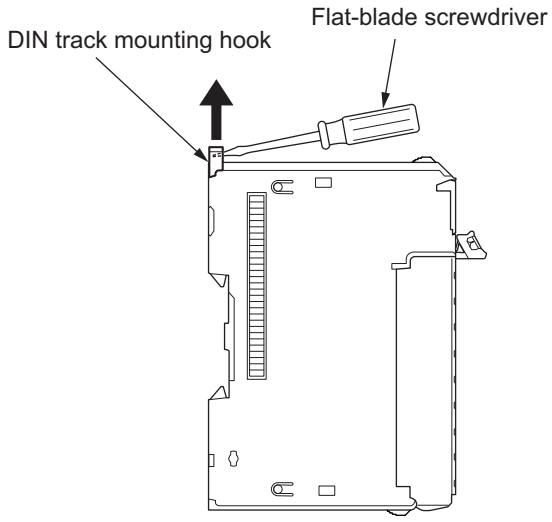
The markers made by OMRON cannot be printed on with commercially available special printers.

4-1-3 Removing NX Units

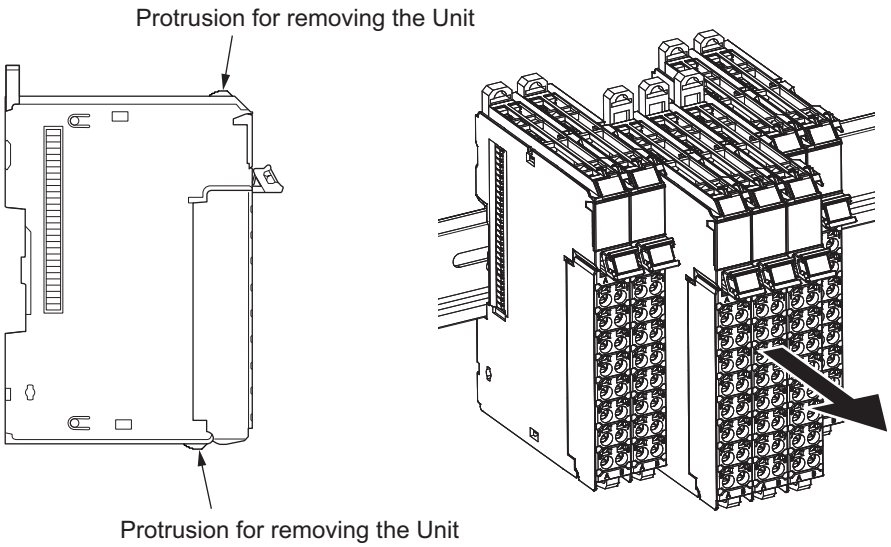
Precautions for Safe Use

Always turn OFF the Unit power supply and I/O power supply before you remove the NX Unit.

1 Use a flat-blade screwdriver to pull up the DIN Track mounting hook on the Unit to remove.



2 Put your fingers on the protrusions for removing multiple NX Units including the Unit to be removed, then pull out straight forward to remove.



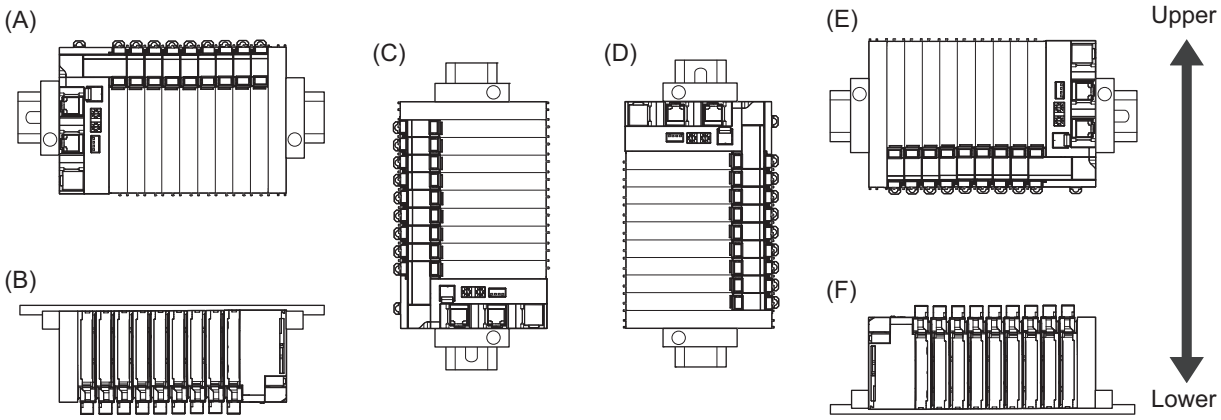
Precautions for Correct Use

- When removing an NX Unit, remove multiple Units together which include the one you want to remove. If you attempt to remove only one Unit, it is stuck and hard to pull out.
- Do not unlock the DIN track mounting hooks on all of the NX Units at the same time. If you unlock the DIN Track mounting hooks on all of the NX Units at the same time, all of the Units may come off.

4-1-4 Installation Orientation

Orientation is possible in the following six directions.

(A) is the upright orientation and (B) to (F) are other orientations.



However, there are restrictions on the installation orientation and restrictions to specifications that can result from the Communications Coupler Units and NX Units that are used.

Refer to the user's manuals for the Communications Coupler Units, NX Units and System Units that you will use for details on restrictions.

Precautions for Safe Use

For installation orientations (C) and (D) in the above figure, support the cables, e.g., with a duct, so that the End Plate on the bottom is not subjected to the weight of the cables.The weight of the cables may cause the bottom End Plate to slide downward so that the Slave Terminal is no longer secured to the DIN Track, which may cause malfunctions.

4-2 Wiring the Power Supply to the Slave Terminal

This section describes how to supply power to the Slave Terminal and wiring.

4-2-1 Power Supply Types

There are the following two types of power supplies that supply power to the Slave Terminal.

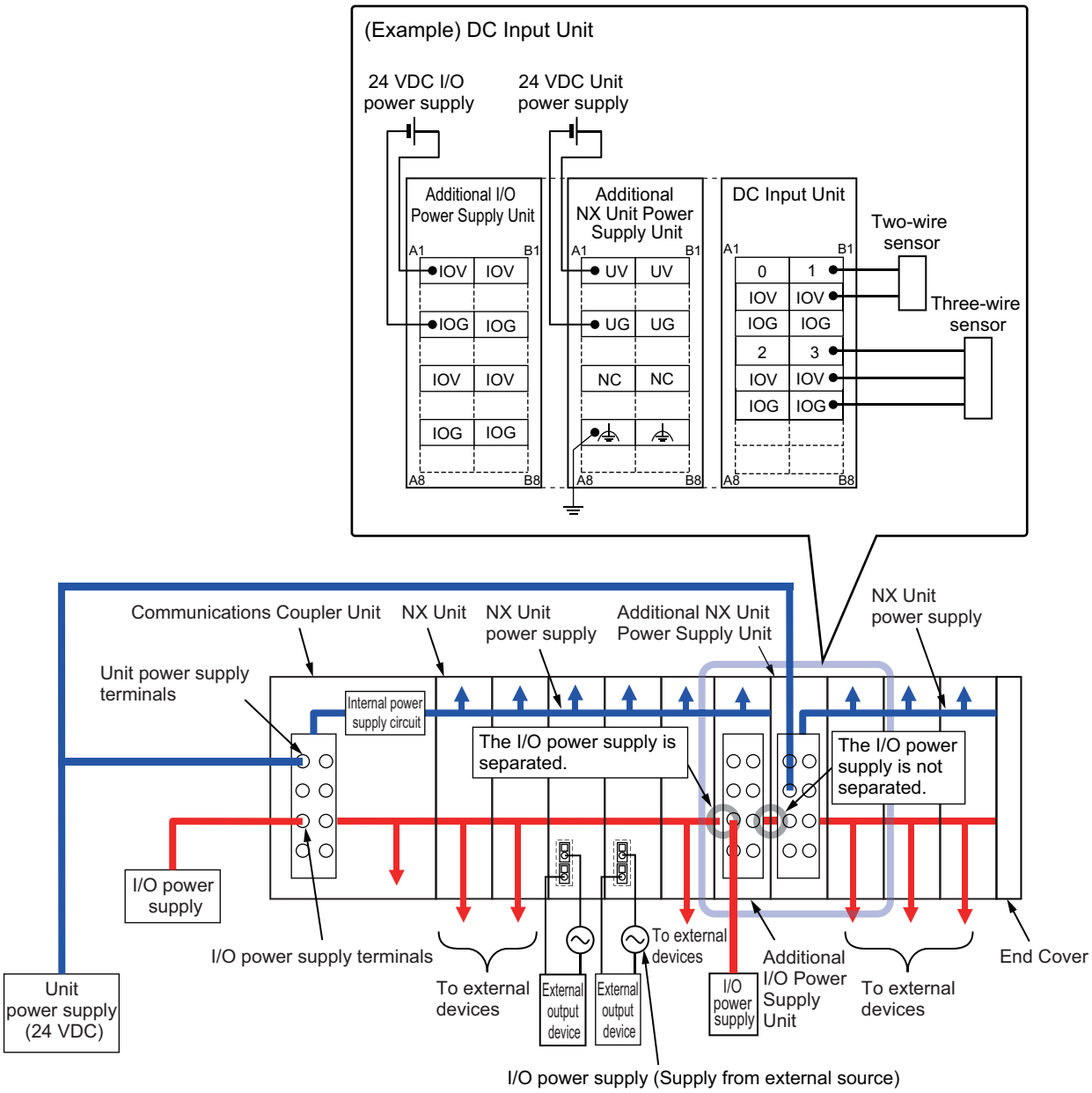
Power supply name	Description
Unit power supply	This is the power supply for generating the NX Unit power supply required for the Slave Terminal to operate. This is connected to the Unit power supply terminal on the Communications Coupler Unit or on the Additional NX Unit Power Supply Unit. The internal power supply circuit in the Communications Coupler Unit or the Additional NX Unit Power Supply Unit generates the NX Unit power supply from the Unit power supply. The internal circuits of the Communications Coupler Unit and NX Units operate by the NX Unit power supply. The NX Unit power supply is supplied to the NX Units in the Slave Terminal through the NX bus connectors.
I/O power supply	This power supply is used for driving the I/O circuits of the NX Units and for the connected external devices. This is connected to the I/O power supply terminal on the Communications Coupler Unit or the Additional I/O Power Supply Unit. The I/O power supply is used for the following applications. • I/O circuits operations in the Digital I/O Units • Input current in a Digital Input Unit • Load current of the external load of a Digital Output Unit • Power supply for the connected external devices The I/O power supply is supplied to the NX Units from the I/O power supply terminals and through the NX bus connectors.

4-2-2 Supplying Each Power Supply and Wiring

The supply method for each power supply to the NX Units is as follows.

Power supply name	Description
NX Unit power supply	This power is supplied to the NX Units through the NX bus connectors by connecting a Unit power supply to the Unit power supply terminals on the Communications Coupler Unit or Additional NX Unit Power Supply Units.
I/O power supply	This power is supplied by one of the following two methods. Refer to *A-1 Data Sheet* on page A-2 for the supply method of each NX Unit. • Supply from the NX bus This power is supplied through the NX bus connectors by connecting an I/O power supply to the I/O power supply terminals on the Communications Coupler Unit or Additional I/O Power Supply Units. • Supply from external source This power is supplied to the Units from an external source. I/O power is supplied by connecting an I/O power supply to the I/O power supply terminals on the Units.

The following are wiring diagrams (examples) for each power supply.


(Example) DC Input Unit
24 VDC I/O power supply
24 VDC Unit power supply
Additional I/O Power Supply Unit
Additional NX Unit Power Supply Unit
DC Input Unit
Two-wire sensor
Three-wire sensor
Communications Coupler Unit
NX Unit
NX Unit power supply
Additional NX Unit Power Supply Unit
NX Unit power supply
Unit power supply terminals
Internal power supply circuit
The I/O power supply is separated.
The I/O power supply is not separated.
I/O power supply
I/O power supply terminals
To external devices
External output device
To external devices
Additional I/O Power Supply Unit
To external devices
End Cover
Unit power supply (24 VDC)
I/O power supply (Supply from external source)

Precautions for Correct Use

Always use separate power supplies for the Unit power supply and the I/O power supply. If you supply power from the same power supply, noise may cause malfunctions.

Additional Information

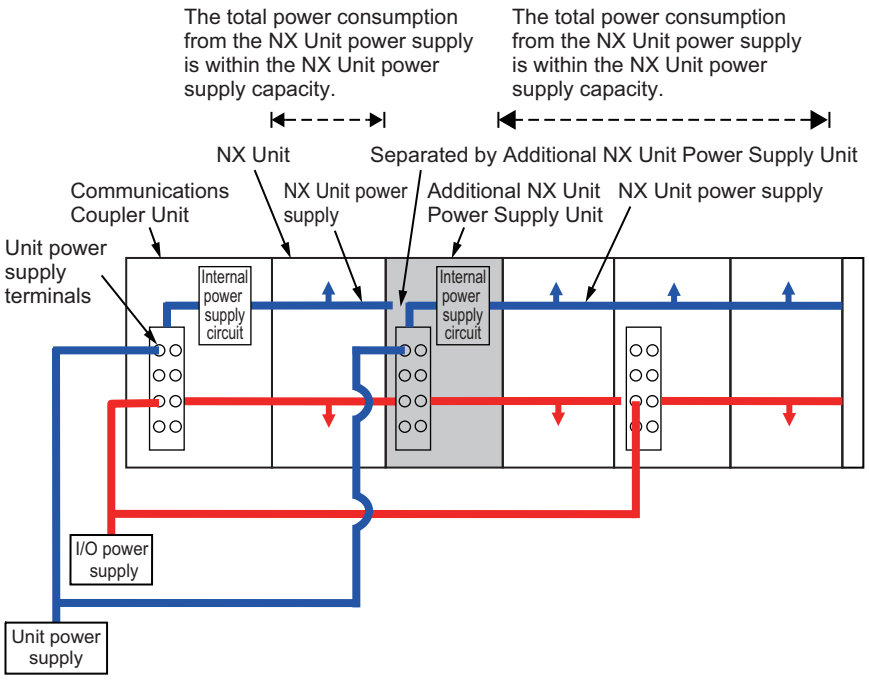
Refer to the user's manual for the Communications Coupler Unit on design for power supply to the Slave Terminal.

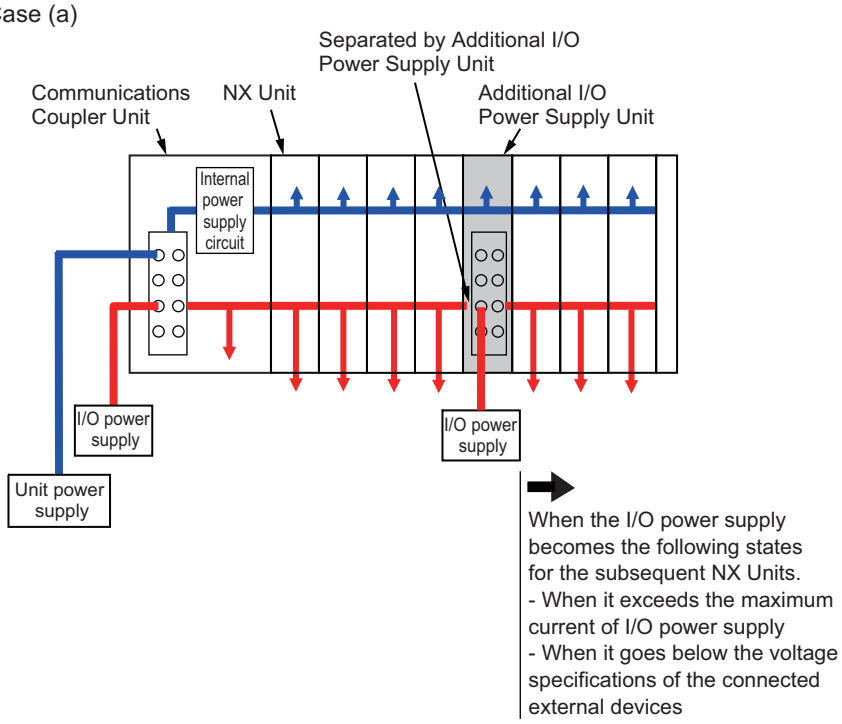
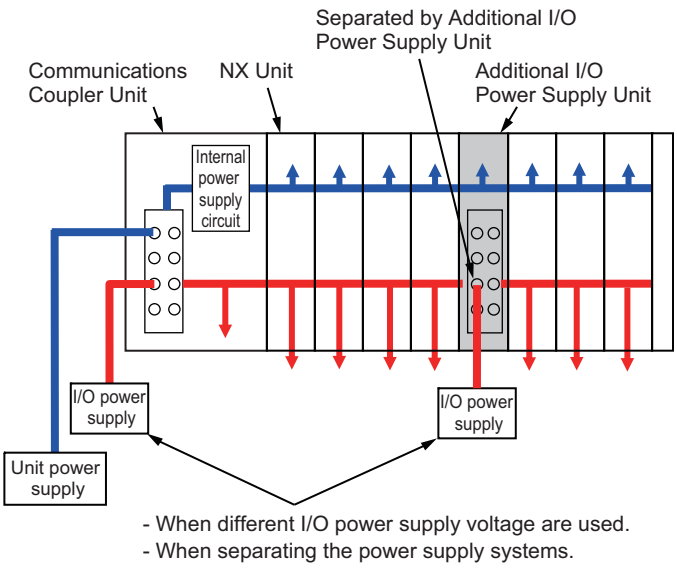
4-2-3 Power Supply-related Units and Wiring Methods

A Communications Coupler Unit supplies the NX Unit power supply and I/O power supply to the NX Units in the Slave Terminal.

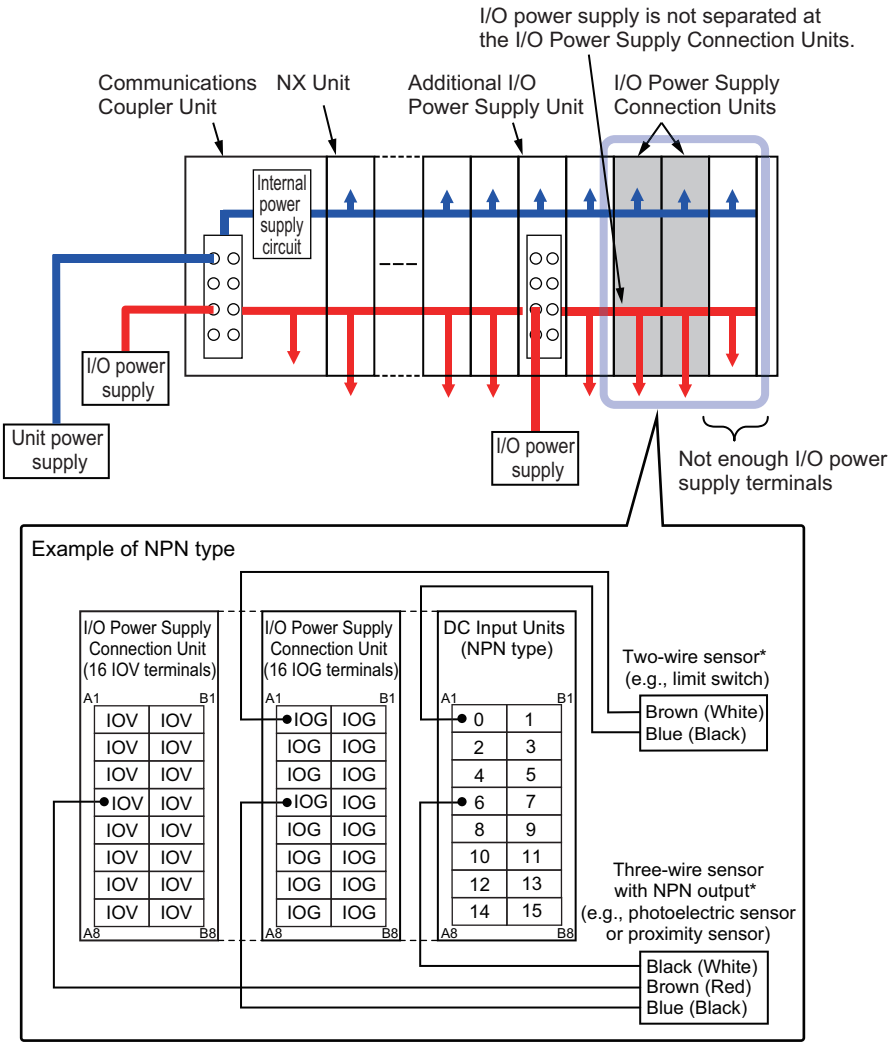
There are the following types of NX-series power supply-related Units other than Communications Coupler Unit.

Refer to NX-series catalogs or OMRON websites, or ask your OMRON representative for information on the most recent lineup of NX Units.

Unit name	Function
Additional NX Unit Power Supply Unit	This NX Unit provides NX Unit power supply. This NX Unit is used when the total power consumption of the NX Units in the Slave Terminal exceeds the NX Unit power supply capacity of the Communications Coupler Unit.  The I/O power supply for the Additional NX Unit Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.

Unit name	Function
Additional I/O Power Supply Unit	This NX Unit provides additional I/O power supply. Use this NX Unit in the following cases. (a) When the I/O power supply capacity is insufficient • When the total current consumption for the I/O power supply exceeds the maximum current of I/O power supply of the Communications Coupler Unit • When a voltage drop in the I/O power supply causes the voltage of the I/O power supply to go below the voltage specifications of the I/O circuits or connected external devices (b) Separating the I/O power supply • When connected external devices have different I/O power supply voltages • When separating the power supply systems Case (a)  Case (b)  The NX Unit power supply of the Additional I/O Power Supply Unit is connected to the NX Unit on the left through the NX bus connector.

Unit name	Function
I/O Power Supply Connection Unit	This NX Unit is used when there are not enough I/O power supply terminals for the connected external devices that are connected to NX Units such as Digital I/O Units and Analog I/O Units.


I/O power supply is not separated at the I/O Power Supply Connection Units.
Communications Coupler Unit
NX Unit
Additional I/O Power Supply Unit
I/O Power Supply Connection Units
Internal power supply circuit
I/O power supply
Unit power supply
I/O power supply
Not enough I/O power supply terminals
Example of NPN type
I/O Power Supply Connection Unit (16 IOV terminals)
I/O Power Supply Connection Unit (16 IOG terminals)
DC Input Units (NPN type)
Two-wire sensor* (e.g., limit switch)
Brown (White)
Blue (Black)
Three-wire sensor with NPN output* (e.g., photoelectric sensor or proximity sensor)
Black (White)
Brown (Red)
Blue (Black)

* Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

4-3 Grounding the Slave Terminal

This section describes how to ground the Slave Terminal.

NX Units with Functional Ground Terminals

Some of the NX Units in a Slave Terminal have the following functional ground terminals.

- Communications Coupler Unit
- Additional NX Unit Power Supply Unit
- Shield Connection Unit

Additional Information

A Shield Connection Unit is used to connect the shield when connecting to external input devices. You can ground more than one shield to the same ground pole to reduce the amount of wiring work for grounding.

Refer to the user's manual of the Communications Coupler Unit for details on grounding the Slave Terminal.

4-4 Wiring the Additional Power Supply Units

This section describes how to wire the terminals on the Additional Power Supply Units.

⚠ WARNING

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

⚠ Caution

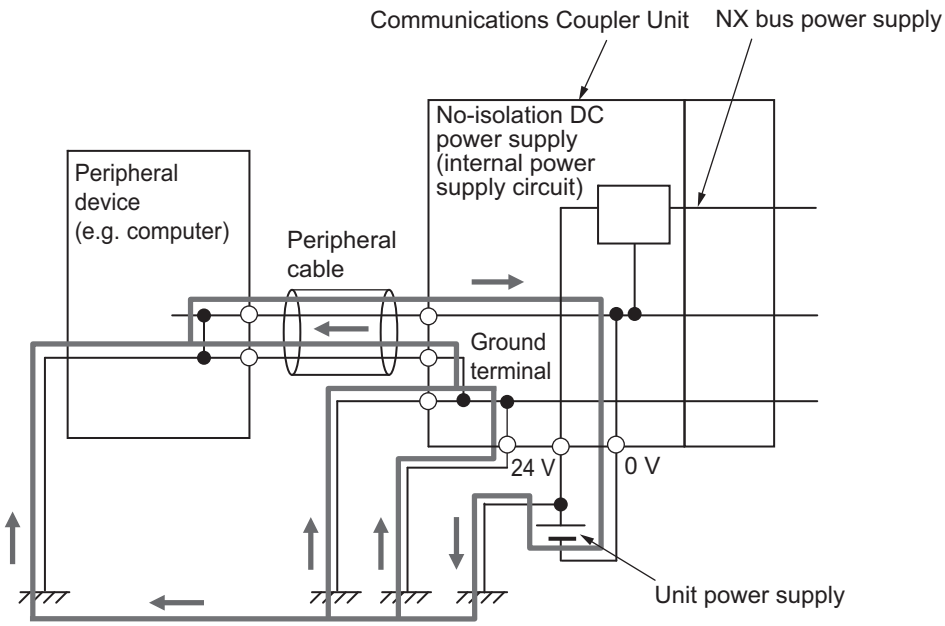
Precautions for using non-isolated power supply

When you connect a computer or other peripheral device to any of the following NX Units, ground the 0 V side of an external power supply (Unit power supply) or do not ground it at all.

- Communications Coupler Unit with non-isolated type internal power supply circuits
- Communications Coupler Unit that is connected to a non-isolated type Additional NX Unit Power Supply Unit

Depending on how the peripheral device is grounded, the external power supply (Unit power supply) may be shorted. Never ground the 24 V side of the power supply as shown in the figure below.

<Grounding that causes a 24-V power supply to short>



4-4-1 Wiring the Additional NX Unit Power Supply Unit

This section describes how to wire Additional NX Unit Power Supply Unit.

Wiring Terminals

- Unit power supply terminals
- Functional ground terminals

Wiring Examples

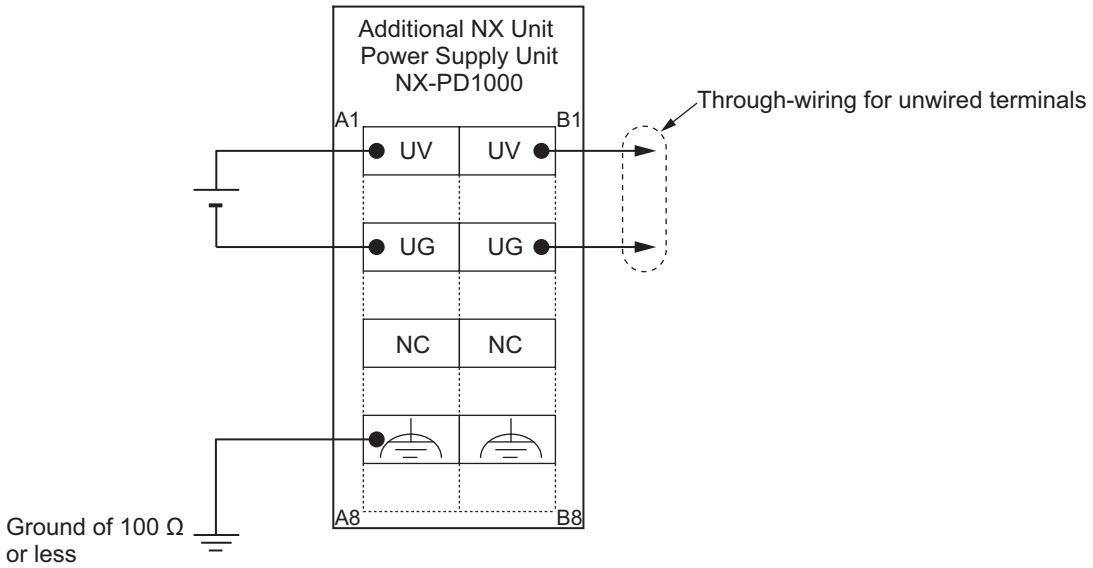
The Unit power supply is connected to the Unit power supply terminal (UV/UG).

You can use the unwired terminals of the Unit power supply terminals for through-wiring to an Additional NX Unit Power Supply Unit or to the Unit power supply terminals on another EtherCAT Coupler Unit.

Make the current supplied from the unwired terminals meet the following conditions.

Current supplied from unwired terminals ≤ Current capacity of power supply terminal - Current consumption of Additional NX Unit Power Supply Unit block

Refer to *Power Supply Used and Required Power Supply Capacity* on page 4-17 for information on the block.



Ground the functional ground terminal to 100 Ω or less.

Power Supply Used and Required Power Supply Capacity

Power Supply Used

24 VDC power is supplied to the Unit power supply terminals (+, –). The power supply voltage range for the Unit power supplies is as follows.

Model	Power supply voltage range
NX-PD1000	20.4 to 28.8 VDC

For the Unit power supply, use a SELV power supply with overcurrent protection.

A SELV power supply refers to a power supply with double or reinforced insulation between input and output and with an output voltage of 30 V rms with a 42.4-V peak or an output voltage of 60 VDC max.

We recommend the following power supply.

Recommended power supply: OMRON S8JX-series Power Supply

Precautions for Correct Use

Use the same Unit power supply to supply power to the entire Slave Terminal. If you supply power from different power supplies, because 0 V is common inside the Slave Terminal, differences in electrical potential may cause unexpected currents in the NX Unit power supply, which may cause breakdowns and malfunctions.

Calculating the Unit Power Supply Capacity

<Equation>

The equation for the Unit power supply capacity in the Slave Terminal is as follows.

Unit power supply capacity in the Slave Terminal = The total power capacity from Unit power supply on each block

The equation for the Unit power supply capacity on each block in the Slave Terminal is as follows.

Unit power supply capacity requirement for each block = ((A) + (B))/(C)

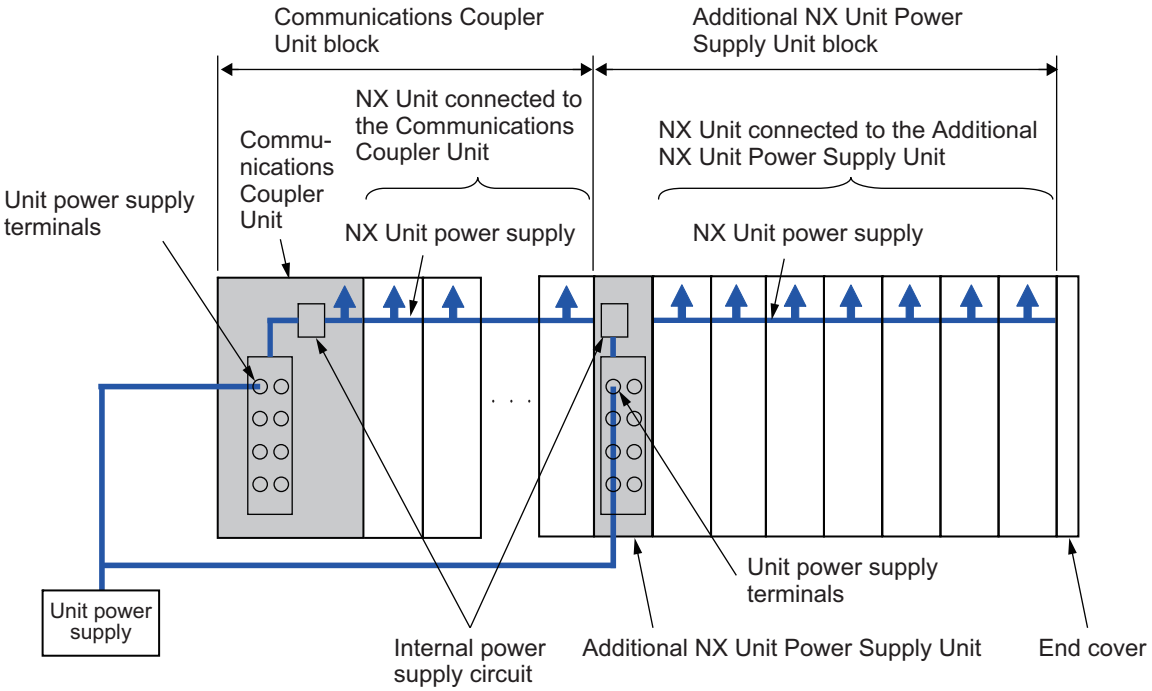
(A): The NX Unit power consumption of the Unit that supplies NX Unit power

(B): The total power consumption from the NX Unit power supply that is required by the NX Units that are connected to the Unit that supplies NX Unit power

(C): The NX Unit power supply efficiency of the Unit that supplies NX Unit power

<Block>

The following shows the Unit that supplies NX Unit power and its supplying range. For example, the Slave Terminal in the following diagram is configured with two blocks: the Communications Coupler Unit block and the Additional NX Unit Power Supply Unit block.


Communications Coupler Unit block
Additional NX Unit Power Supply Unit block
NX Unit connected to the Communications Coupler Unit
NX Unit connected to the Additional NX Unit Power Supply Unit
Commu-nications Coupler Unit
Unit power supply terminals
NX Unit power supply
NX Unit power supply
Unit power supply terminals
Unit power supply
Internal power supply circuit
Additional NX Unit Power Supply Unit
End cover

The total Unit power supply capacity for these two blocks is the power supply capacity that the Slave Terminal requires.

Precautions for Correct Use

Select a Unit power supply with sufficient capacity by considering the inrush current when the power is turned ON. Sometimes, the Unit power supply may not be turned ON caused by inrush current when the power is turned ON.

4-4-2 Wiring the Additional I/O Power Supply Unit

This section describes how to wire Additional I/O Power Supply Unit.

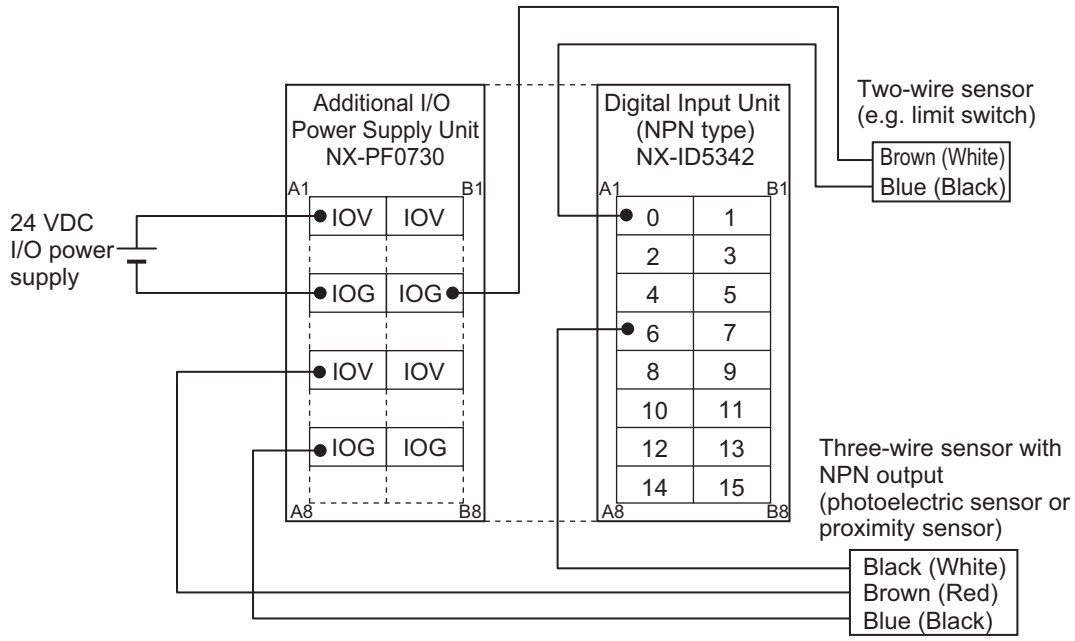
Wiring Terminals

I/O power supply terminals

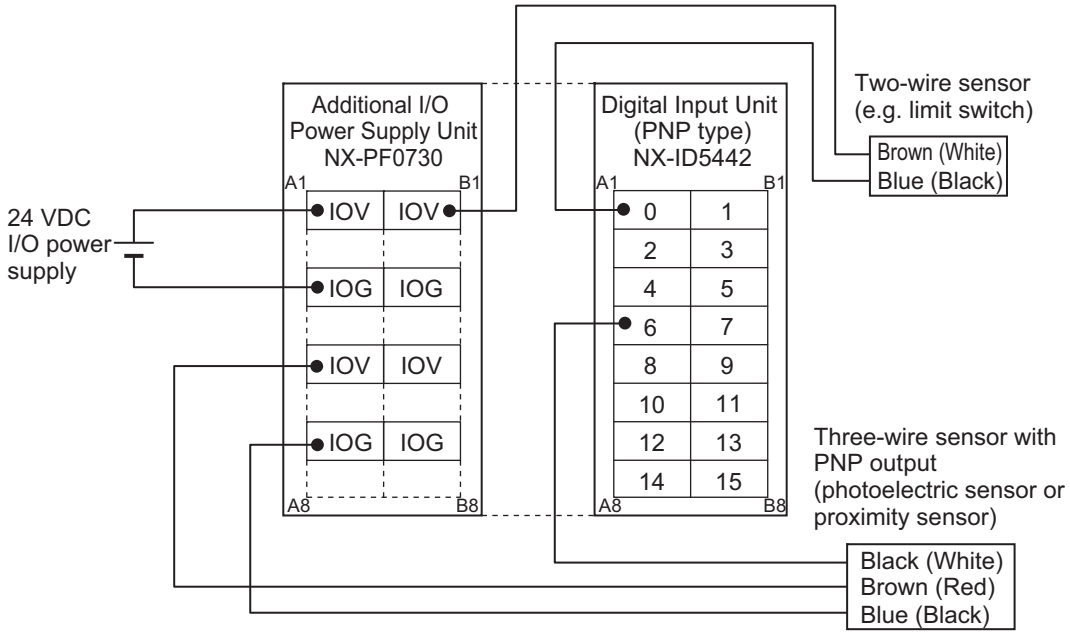
Wiring Examples

The external power supply is connected to the A1 and A3 terminals of the I/O power supply terminals. The other I/O power supply terminals can be used for power supply for connected external devices.

- **NPN Type (NX-ID5342)**



● PNP Type (NX-ID5442)



Additional Information

Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

Power Supply Used and Required Power Supply Capacity

Power Supply Used

5 to 24 VDC power is supplied to A1 and A3 terminals of the I/O power supply terminals (IOV or IOG).

For the I/O power supply, use a SELV power supply with overcurrent protection.

A SELV power supply refers to a power supply with double or reinforced insulation between input and output and with an output voltage of 30 V rms with a 42.4-V peak or an output voltage of 60 VDC max.

We recommend the following power supply.

Recommended power supply: OMRON S8JX-series Power Supply

Required Power Supply Capacity

The power supply capacity required by the I/O power supply to be connected is equal to the NX Unit power supply total power consumption that uses the same I/O power supply.

However, if the inrush current occurs when a connected external device turns ON or OFF, do not allow the effective value of the I/O power supply current including the inrush current to exceed the following rated values.

- Maximum current of I/O power supply
- Current capacity of I/O power supply terminals

Do not allow the inrush current to exceed the values in the table below.

Unit name	Model	Peak value	Pulse width
Additional I/O Power Supply Unit	NX-PF0730	50 A	1 s
	NX-PF0630	20 A	1 s

Refer to the *NX-series EtherCAT Coupler Unit User's Manual* (Cat. No. W519) for information on the EtherCAT Coupler Units.

Calculating the effective value of the I/O power supply current

The following gives the equation to calculate the effective value of the I/O power supply current, Irms.

$$Irms = \sqrt{Ip^2 \times D + Ia^2 \times (1-D)}$$
$$(D = \tau / T)$$

Ip: Peak inrush current (A)

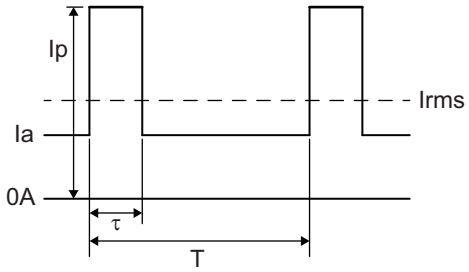
Irms: Effective value of the I/O power supply current (A)

Ia: Total current consumption from I/O power supply (A)

D: Inrush current duty

τ: Inrush current pulse width (s)

T: Inrush current period (s)



For details on the current consumption from I/O power supply of the NX Units to be used, refer to the user's manual for individual NX Units.

Refer to the user's manual of the Communications Coupler Unit for details on calculating current consumption from I/O power supply.

Precautions for Correct Use

Select an I/O power supply with sufficient capacity by considering the inrush current when the power is turned ON. Sometimes, the I/O power supply may not be turned ON caused by inrush current when the power is turned ON.

4-4-3 Protective Devices

This section describes the protective devices to protect against short circuits and overcurrents of external circuits.

Overcurrent means the current that flows when an excessive load is connected and one of the following ratings is exceeded.

- For a Unit power supply, the rating of the NX Unit power supply capacity or of the current capacity of the power supply terminals
- For an I/O power supply, the rating of the maximum current of I/O power supply or of the current capacity of the power supply terminals

Refer to the user's manual of the Communications Coupler Unit for details on the ratings for the Communications Coupler Unit.

Refer to the *A-1 Data Sheet* on page A-2 for details on the ratings for NX-series power supply-related Units.

Selecting Protective Devices

Consider the following items you select protective devices.

- Protective device specifications (shut-off and fused circuit breaker detection characteristic, steady current value, etc.)
- Inrush current when the power is turned ON
- Inrush current when connected external devices are turned ON and OFF

For the shut-off and fusing time, select protective devices that fulfill all the conditions in the table below.

- Unit power supply

Current value	Shut-off and fusing time
6 A	1 min max.
12 A	15 s max.
21 A	5 s max.
30 A	2.5 s max.

- I/O power supply

a) Unit model which has 10 A of current capacity of the power supply terminals

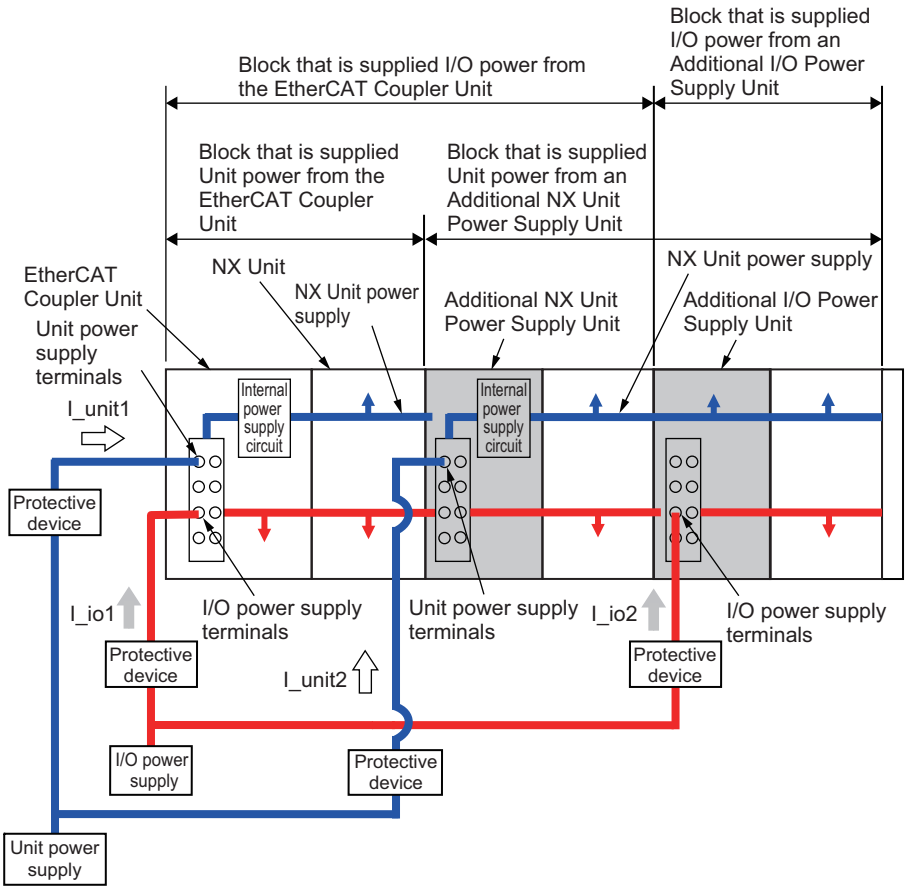
Current value	Shut-off and fusing time
14 A	1 min max.
28 A	9 s max.
56 A	1.5 s max.
70 A	0.8 s max.

b) Unit model which has 4 A of current capacity of the power supply terminals

Current value	Shut-off and fusing time
6 A	1 min max.
12 A	15 s max.
21 A	5 s max.
30 A	2.5 s max.

Installation Locations for Protective Devices

Install protective devices for the Unit power supply and I/O power supply in the locations that are shown in the figure below.


Block that is supplied I/O power from an Additional I/O Power Supply Unit
Block that is supplied I/O power from the EtherCAT Coupler Unit
Block that is supplied Unit power from the EtherCAT Coupler Unit
Block that is supplied Unit power from an Additional NX Unit Power Supply Unit
EtherCAT Coupler Unit
NX Unit
NX Unit power supply
Additional NX Unit Power Supply Unit
NX Unit power supply
Additional I/O Power Supply Unit
Unit power supply terminals
I_unit1
Internal power supply circuit
Internal power supply circuit
Protective device
I_io1
I/O power supply terminals
Unit power supply terminals
I_io2
I/O power supply terminals
Protective device
I_unit2
Protective device
I/O power supply
Protective device
Unit power supply

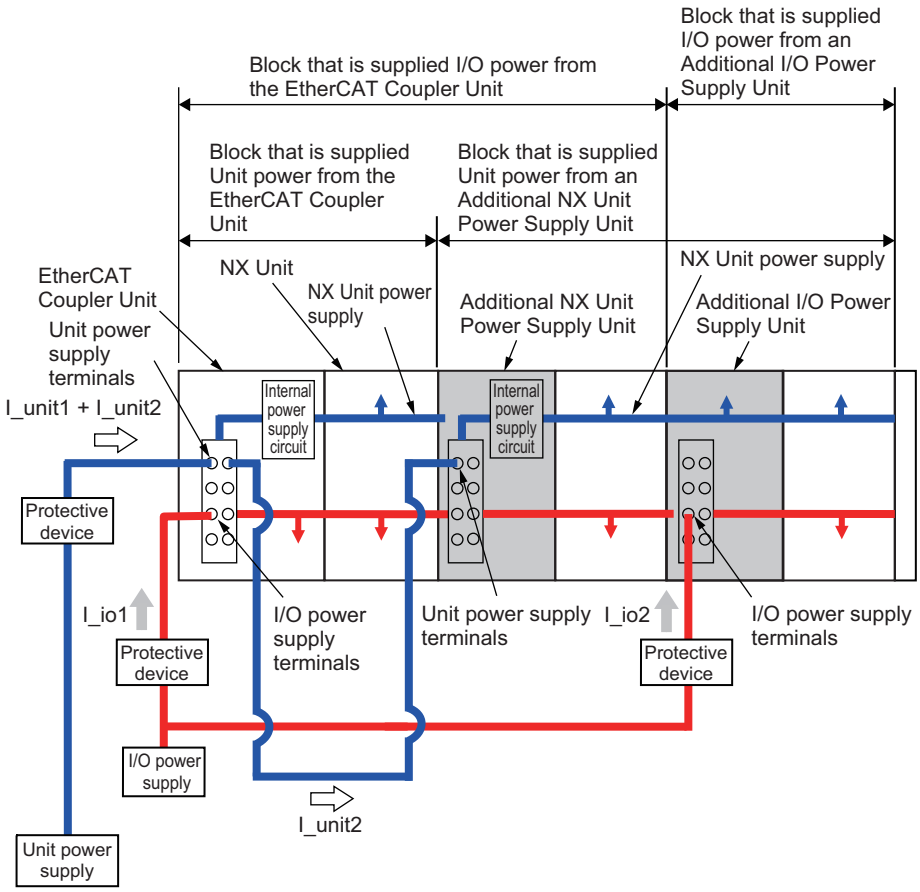
However, fewer protective devices may be required when the current consumption of each block does not exceed the rated current value. An example of this is shown below.

Using unwired Unit power supply terminals

In this example, the current consumption from each power supply is as follows.

Current consumption from Unit power supply: I_unit1+ I_unit2 ≤ Lowest rated current

Current consumption from I/O power supply: I_io1+ I_io2 ≥ Lowest rated current


Block that is supplied I/O power from the EtherCAT Coupler Unit
Block that is supplied I/O power from an Additional I/O Power Supply Unit
Block that is supplied Unit power from the EtherCAT Coupler Unit
Block that is supplied Unit power from an Additional NX Unit Power Supply Unit
EtherCAT Coupler Unit
Unit power supply terminals
I_unit1 + I_unit2
NX Unit
NX Unit power supply
Additional NX Unit Power Supply Unit
NX Unit power supply
Additional I/O Power Supply Unit
Internal power supply circuit
Internal power supply circuit
Protective device
I_io1
Protective device
I/O power supply terminals
Unit power supply terminals
I_io2
Protective device
I/O power supply terminals
I/O power supply
I_unit2
Unit power supply

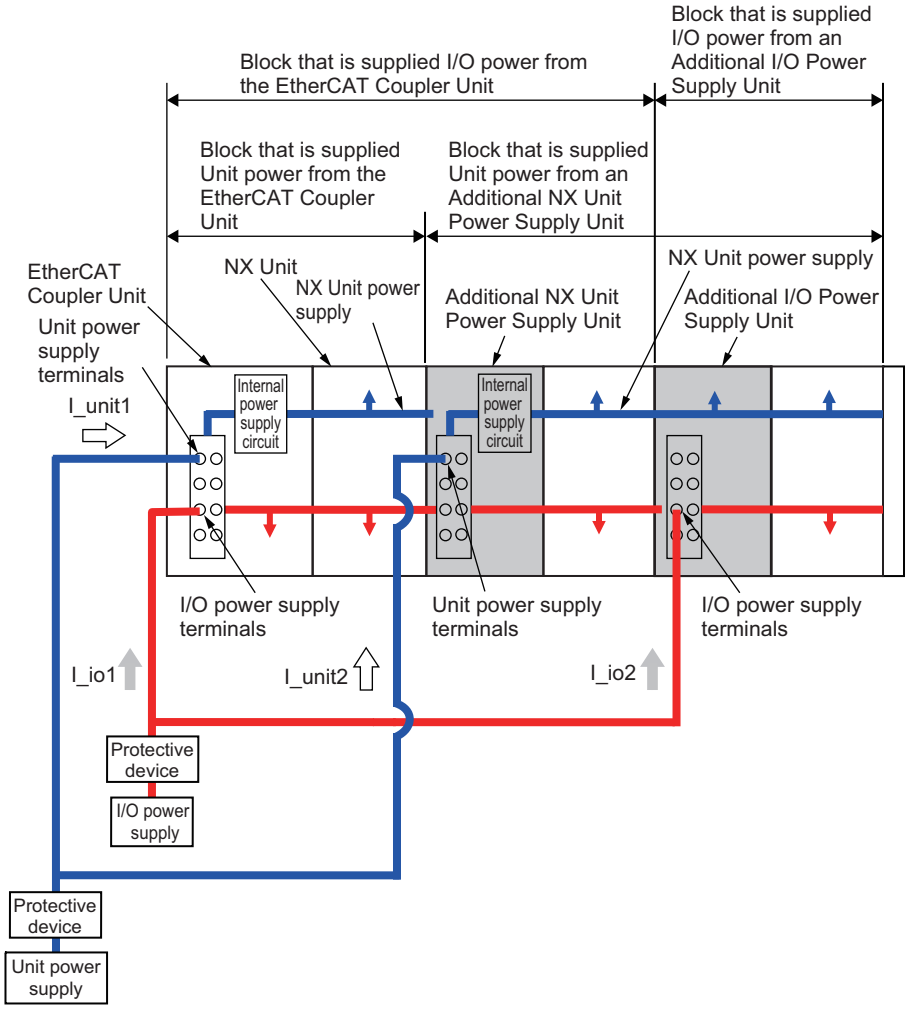
When total current consumption for all blocks does not exceed the rated current

In this example, the current consumption from each power supply is as follows.

Current consumption from Unit power supply: I_unit1+ I_unit2 ≤ Lowest rated current

Current consumption from I/O power supply: I_io1+ I_io2 ≤ Lowest rated current*1

*1. This is the lowest rated current of all of the Units that supply I/O power and are connected to protective devices. For example, if terminals with both a 10-A and 4-A capacities are connected, the value is 4 A.


Block that is supplied I/O power from the EtherCAT Coupler Unit
Block that is supplied I/O power from an Additional I/O Power Supply Unit
Block that is supplied Unit power from the EtherCAT Coupler Unit
Block that is supplied Unit power from an Additional NX Unit Power Supply Unit
EtherCAT Coupler Unit
NX Unit
NX Unit power supply
Additional NX Unit Power Supply Unit
NX Unit power supply
Additional I/O Power Supply Unit
Unit power supply terminals
I_unit1
Internal power supply circuit
Internal power supply circuit
I/O power supply terminals
Unit power supply terminals
I/O power supply terminals
I_io1
I_unit2
I_io2
Protective device
I/O power supply
Protective device
Unit power supply

4-5 Wiring the I/O Power Supply Connection Unit

The I/O Power Supply Connection Unit is used as additional I/O power supply terminals when there are not enough I/O power supply terminals in which it is connected to the connected external devices.

This section describes how to wire the I/O Power Supply Connection Unit.

Wiring Terminals

IOV or IOG terminal

Wiring Examples

A wiring example is shown below.

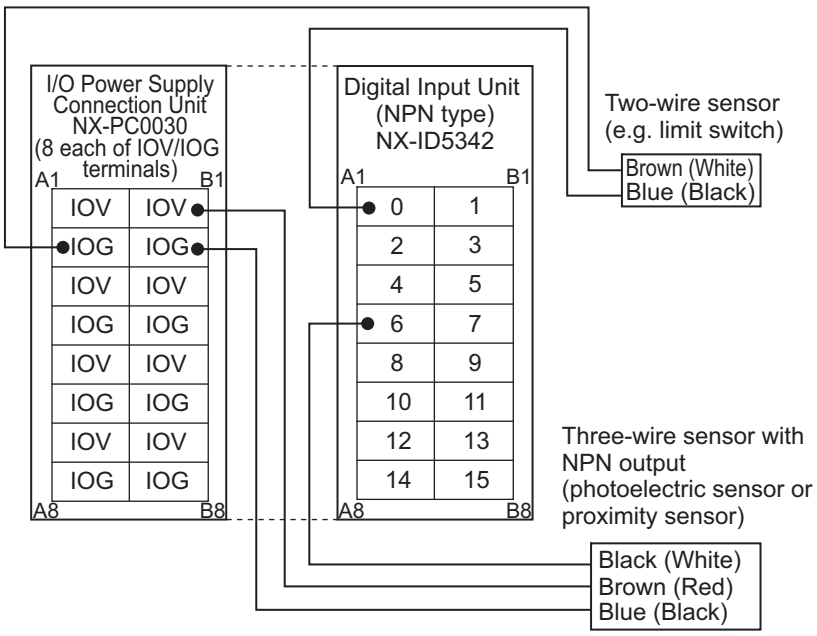
I/O power supply terminals can be used for power supply for connected external devices.

It is not possible to supply I/O power from the external power supply to this Unit.

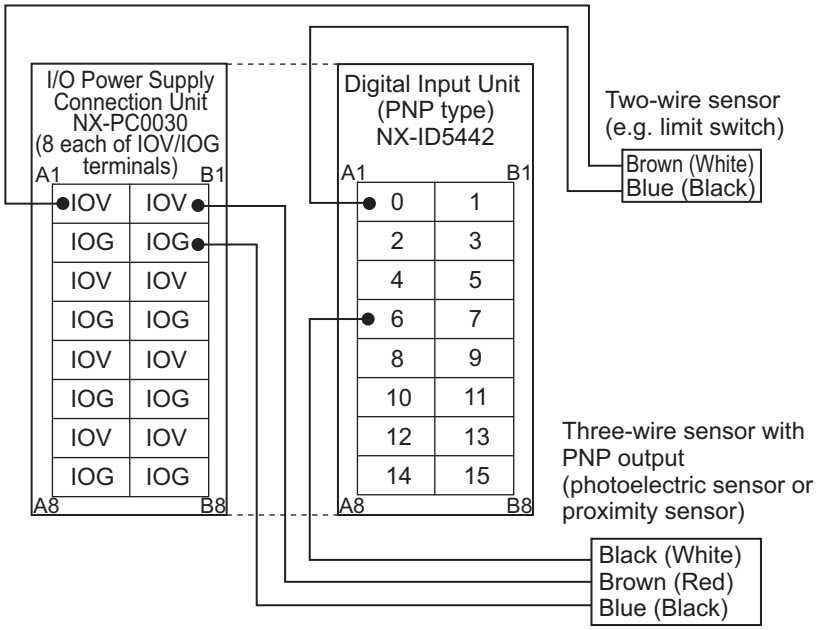
● Wiring Example 1

When the I/O Power Supply Connection Unit (NX-PC0030) is connected to a Digital Input Unit (16 inputs)

NPN type (NX-ID5342)



PNP type (NX-ID5442)



Note Connecting three-wire sensors to all 16 inputs requires two NX-PC0030 Units.

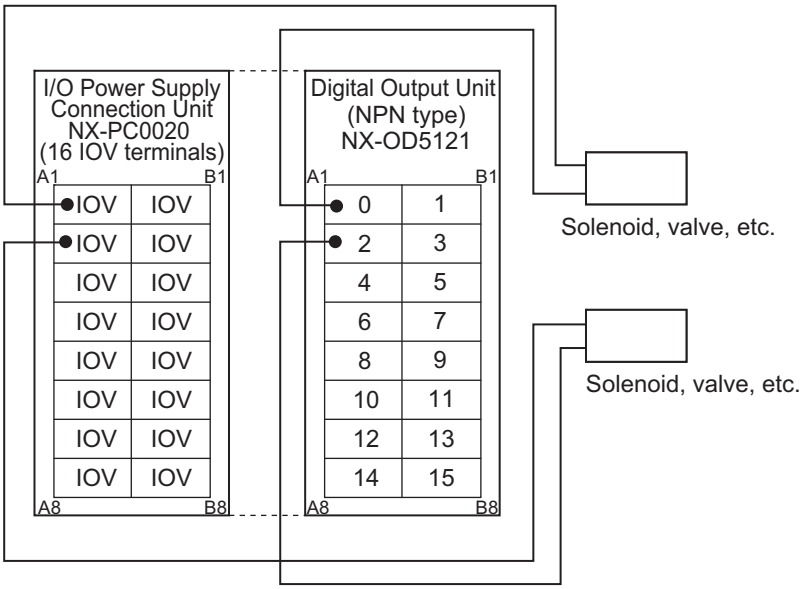
Additional Information

Wire colors have been changed according to revisions in the JIS standards for photoelectric and proximity sensors. The colors in parentheses are the wire colors prior to the revisions.

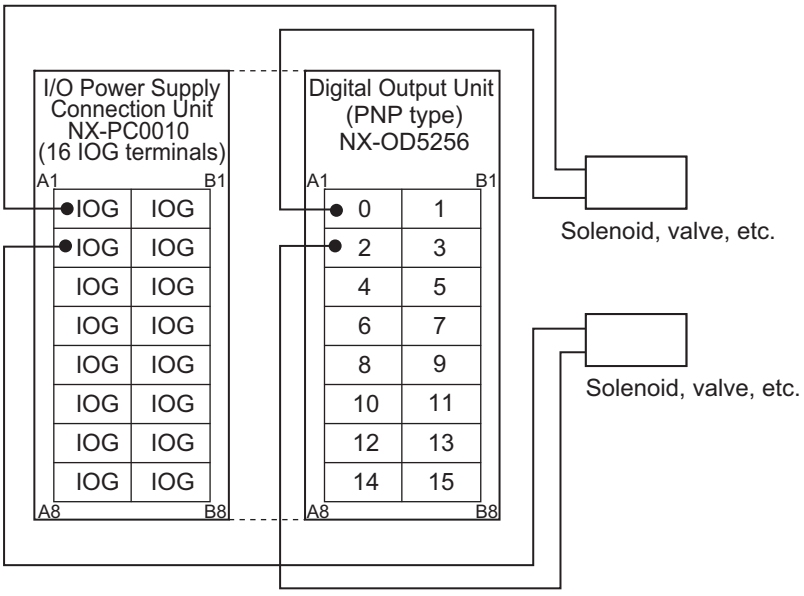
Wiring Example 2

When the I/O Power Supply Connection Unit (NX-PC0020 or NX-PC0010) is connected to a Digital Output Unit (16 outputs)

NPN type (NX-OD5121)



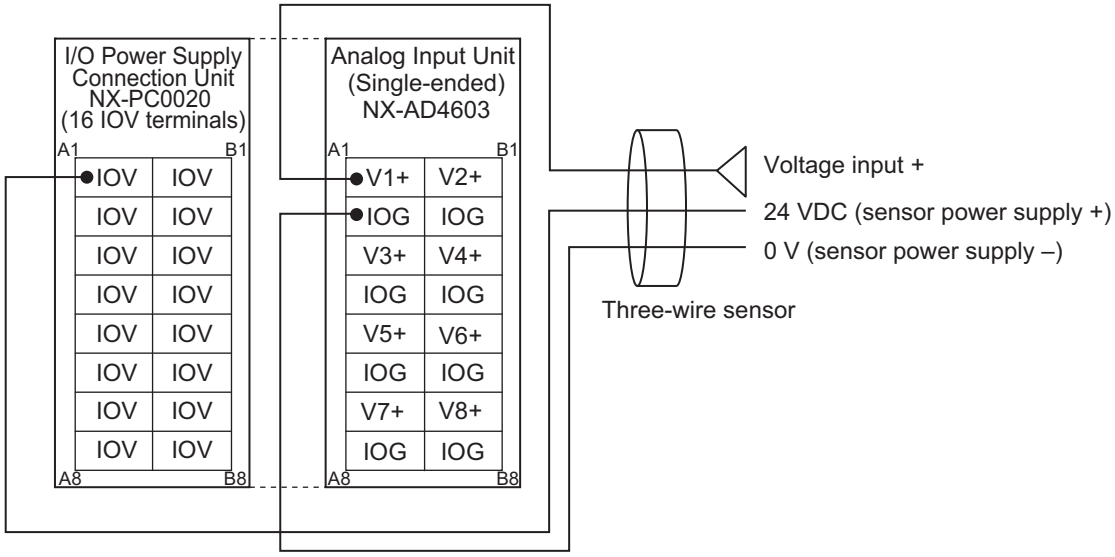
PNP type (NX-OD5256)



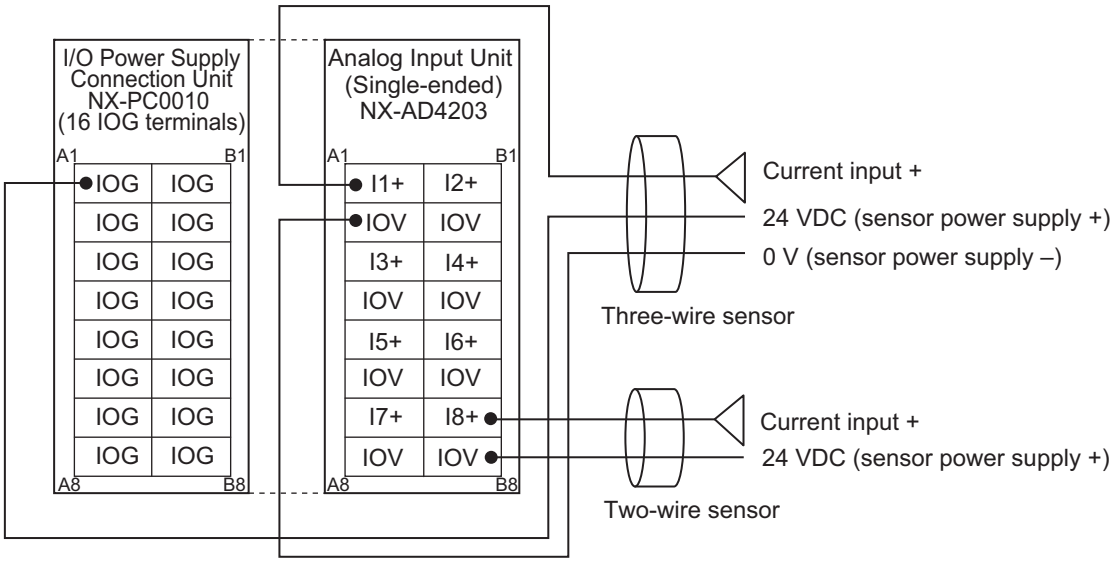
Wiring Example 3

When the I/O Power Supply Connection Unit (NX-PC0020 or NX-PC0010) is connected to an Analog Input Unit (8 inputs, single-ended inputs)

For voltage 8 inputs (NX-AD4603)



For current 8 inputs (NX-AD4203)



4-6 Wiring the Shield Connection Unit

The Shield Connection Unit is used when there are not enough terminals to connect the shield for the connection of external devices.

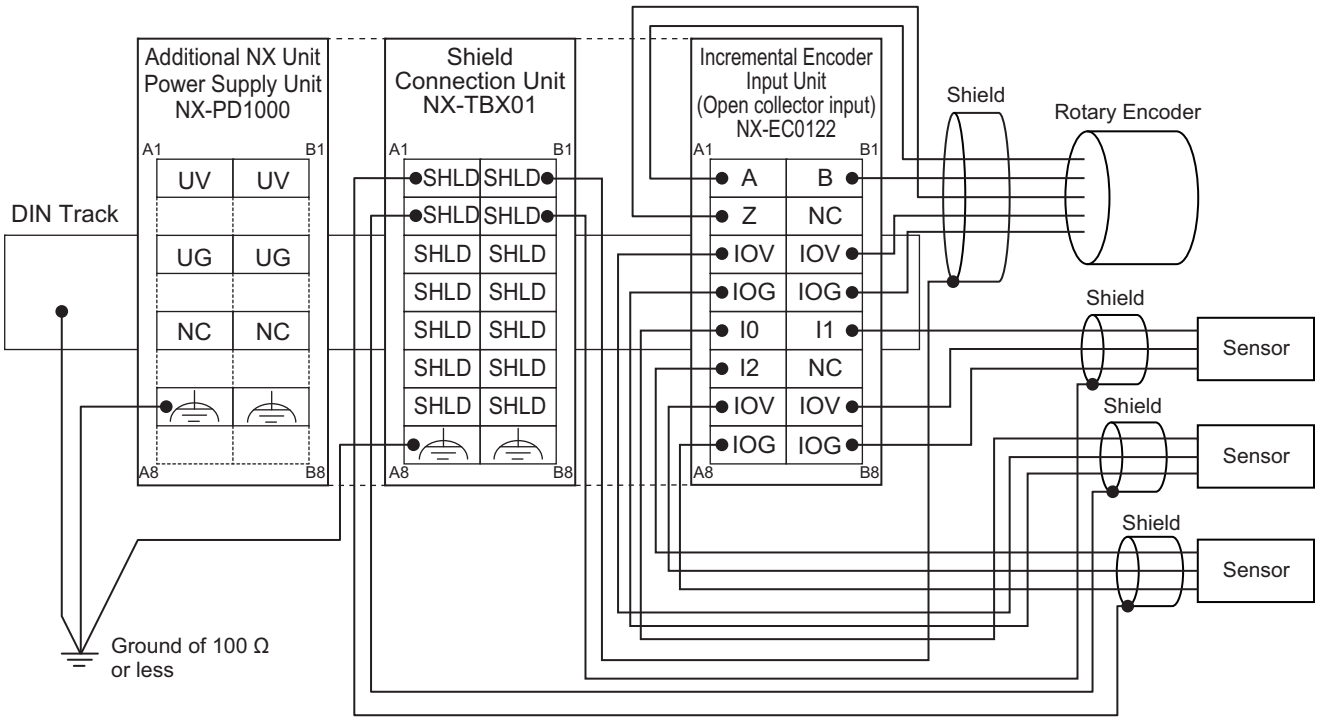
This section describes how to wire the Shield Connection Unit.

Wiring Terminals

- SHLD terminal
- Functional ground terminals

Wiring Examples

The following shows a wiring example in which the shield wire is used to connect an Incremental Encoder Input Unit (NX-EC0122) and a rotary encoder to the Shield Connection Unit.



Connect the shield of cable to the SHLD terminal.

And ground the functional ground terminal to 100 Ω or less.

Refer to the user's manual of the Communications Coupler Unit for details on grounding the Slave Terminal.

4-7 Wiring the Terminals

This section describes how to wire the terminals on the System Units.

⚠ WARNING

Make sure that the voltages and currents that are input to the Units and slaves are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

4-7-1 Wiring to the Screwless Clamping Terminal Block

This section describes how to connect wires to the screwless clamping terminal block, the installation and removing methods, and functions for preventing incorrect attachment.

You can connect ferrules that are attached to the twisted wires to the screwless clamping terminal block. You can also connect the twisted wires or the solid wires to the screwless clamping terminal block. If you connect the ferrules, all you need to do to connect the wires is to insert the ferrules into the terminal holes.

Wiring Terminals

The terminals to be wired are as follows.

- Unit power supply terminals
- I/O power supply terminals
- SHLD terminal
- Functional ground terminals

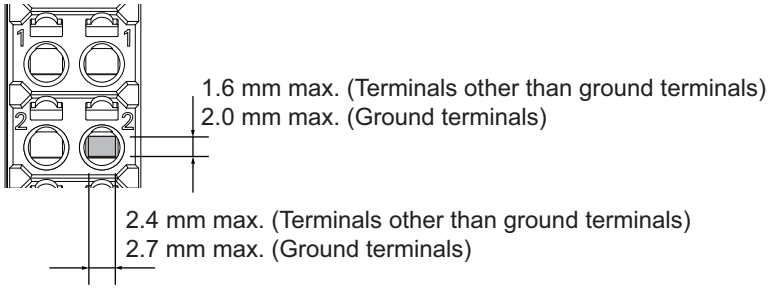
Applicable Wires

The wires that you can connect to the screwless clamping terminal block are twisted wires, solid wires, and ferrules that are attached to the twisted wires. The following section describes the dimensions and processed methods for applicable wires.

● Dimensions of Wires Connected to the Terminal Block

The dimensions of wires that you can connect into the terminal holes of the screwless clamping terminal block are as in the figure below.

Process the applicable wires that are specified in the following description to apply the dimensions.



Using Ferrules

If you use ferrules, attach the twisted wires to them.

Observe the application instructions for your ferrules for the wire stripping length when attaching ferrules.

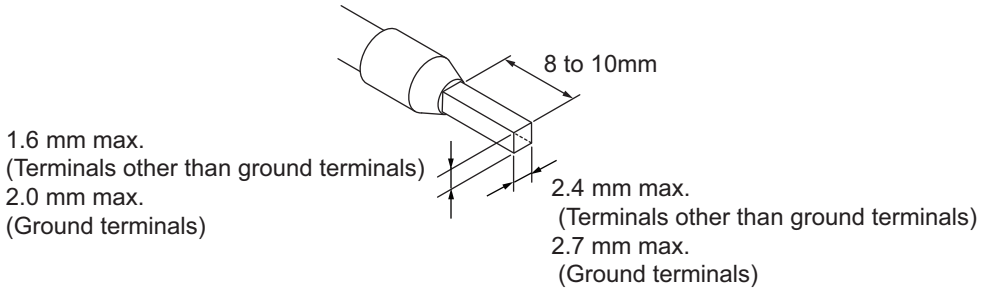
Always use one-pin ferrules. Do not use two-pin ferrules.

The applicable ferrules, wires, and crimping tools are listed in the following table.

Terminal types	Manufacturer	Ferrule model	Applicable wire (mm^2 (AWG))	Crimping tool
Terminals other than ground terminals	Phoenix Contact	AI0,34-8	0.34 (#22)	Phoenix Contact (The figure in parentheses is the applicable wire size.) CRIMPFOX 6 (0.25 to 6 mm^2, AWG24 to 10)
		AI0,5-8	0.5 (#20)	
		AI0,5-10		
		AI0,75-8	0.75 (#18)	
		AI0,75-10		
		AI1,0-8	1.0 (#18)	
		AI1,0-10		
		AI1,5-8	1.5 (#16)	
		AI1,5-10		
Ground terminals		AI2,5-10	2.0 *1	
Terminals other than ground terminals	Weidmuller	H0.14/12	0.14 (#26)	Weidmuller (The figure in parentheses is the applicable wire size.) PZ6 Roto (0.14 to 6 mm^2, AWG26 to 10)
		H0.25/12	0.25 (#24)	
		H0.34/12	0.34 (#22)	
		H0.5/14	0.5 (#20)	
		H0.5/16		
		H0.75/14	0.75 (#18)	
		H0.75/16		
		H1.0/14	1.0 (#18)	
		H1.0/16		
		H1.5/14	1.5 (#16)	
		H1.5/16		

*1. Some AWG14 wires exceed 2.0 mm^2 and cannot be used in the screwless clamping terminal block.

When you use any ferrules other than those in the above table, crimp them to the twisted wires so that the following processed dimensions are achieved.

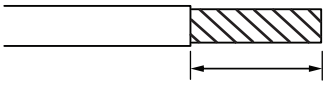


Using Twisted Wires/Solid Wires

If you use the twisted wires or the solid wires, the applicable wire range and conductor length (stripping length) are as follows.

Terminal types	Applicable wire range	Conductor length (stripping length)
Ground terminals*1	2.0 mm^2	9 to 10 mm
Terminals other than ground terminals	0.08 to 1.5 mm^2 AWG28 to 16	8 to 10 mm

*1. When you use the NX-TB□□□1 Terminal Block, use twisted wires to connect the ground terminal. Do not use solid wires.

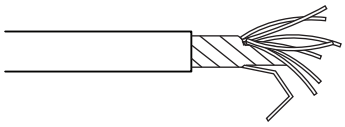


Conductor length (stripping length)

Precautions for Correct Use

- Use cables with suitable wire sizes for the carrying current. There are also restrictions on the current due to the ambient temperature. Refer to the manuals for the cables and use the cables correctly for the operating environment.
- For twisted wires, strip the sheath and twist the conductor portion. Do not unravel or bend the conductor portion of twisted wires or solid wires.

NG



Unravel wires

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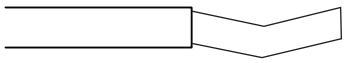
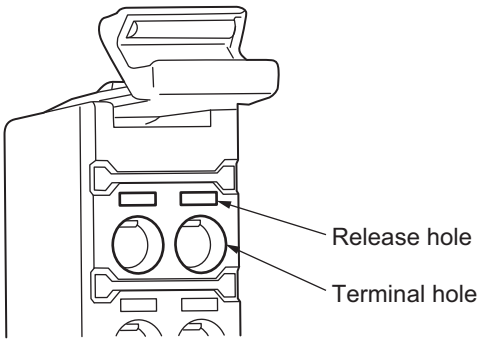


Bend wires

Connecting/Removing Wires

This section describes how to connect and remove wires.

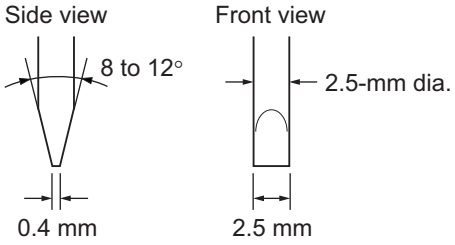
● Terminal Block Parts and Names



● Required Tools

Use a flat-blade screwdriver to connect and remove wires.

Use the following flat-blade screwdriver.



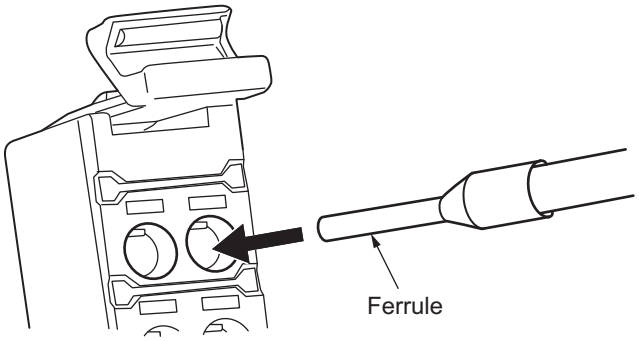
Recommended screwdriver

Model	Manufacturer
SZF 0-0,4×2,5	Phoenix Contact

Connecting Ferrules

Insert the ferrule straight into the terminal hole.

It is not necessary to press a flat-blade screwdriver into the release hole.



After you make a connection, make sure that the ferrule is securely connected to the terminal block.

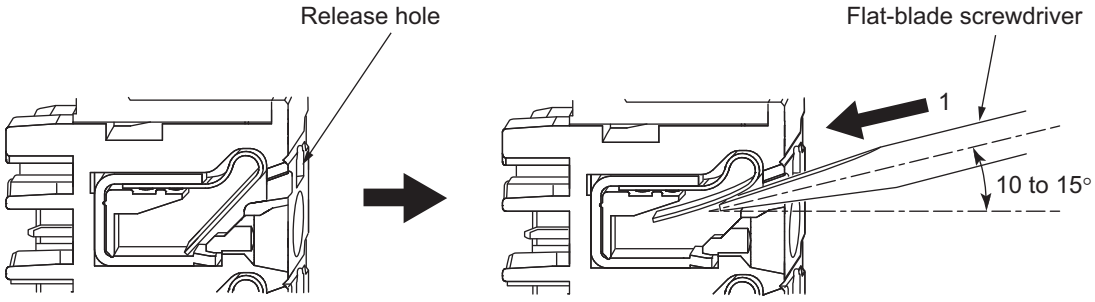
Connecting Twisted Wires/Solid Wires

Use the following procedure to connect the twisted wires or solid wires to the terminal block.

1 Press the a flat-blade screwdriver diagonally into the release hole.

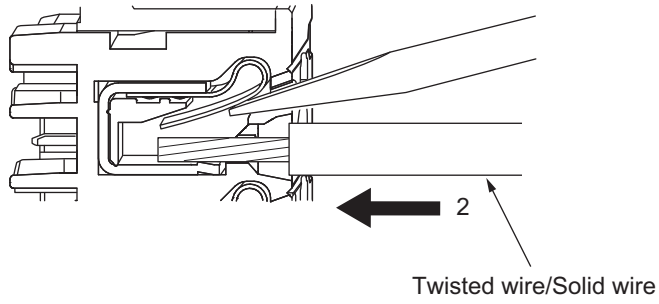
Press at an angle of 10° to 15°.

If you press in the screwdriver correctly, you will feel the spring in the release hole.

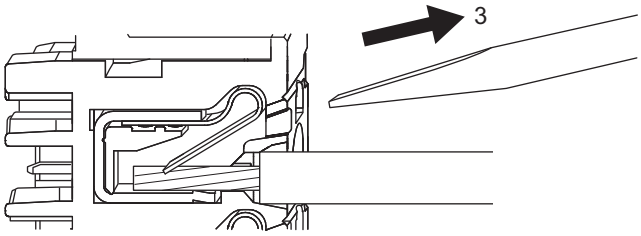


2 Leave the flat-blade screwdriver pressed into the release hole and insert the twisted wire or the solid wire into the terminal hole.

Insert the twisted wire or the solid wire until the stripped portion is no longer visible to prevent shorting.



3 Remove the flat-blade screwdriver from the release hole.

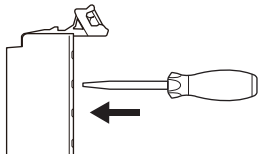


After you make a connection, make sure that the twisted wire or the solid wire is securely connected to the terminal block.

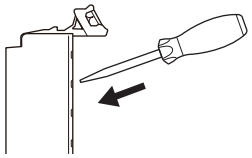
Precautions for Safe Use

- Do not press the flat-blade screwdriver straight into the release hole. Doing so may break the terminal block.

NG

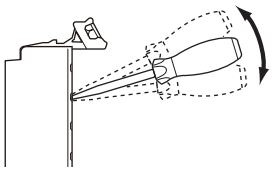


OK

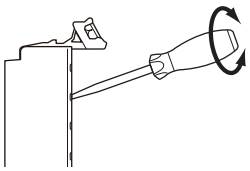


- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.

NG



NG



- Make sure that all wiring is correct.
- Do not bend the cable forcibly. Doing so may sever the cable.

● Removing Wires

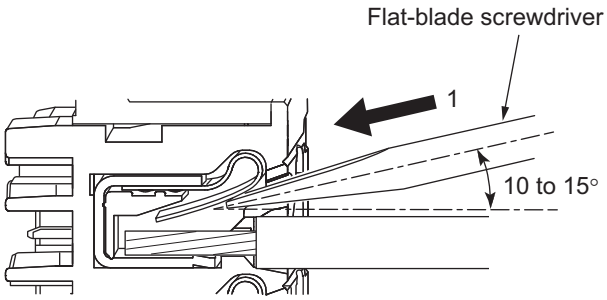
Use the following procedure to remove the wires from the terminal block.

The removal method is the same for ferrules, twisted wires, and solid wires.

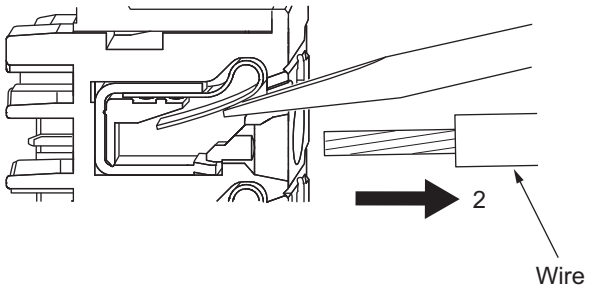
1 Press the flat-blade screwdriver diagonally into the release hole.

Press at an angle of 10° to 15°.

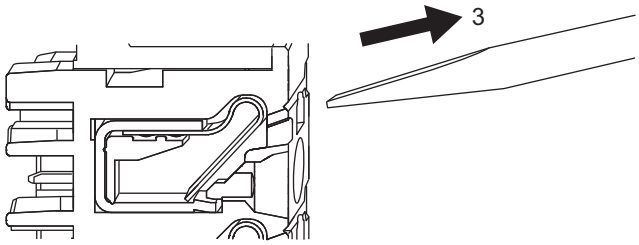
If you press in the screwdriver correctly, you will feel the spring in the release hole.



2 Leave the flat-blade screwdriver pressed into the release hole and pull out the wire.



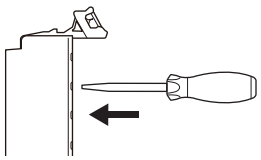
3 Remove the flat-blade screwdriver from the release hole.



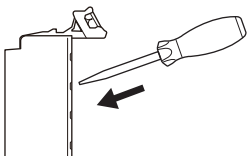
Precautions for Safe Use

- Do not press the flat-blade screwdriver straight into the release hole. Doing so may break the terminal block.

NG

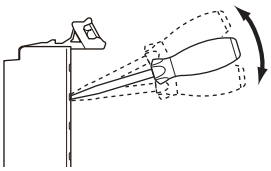


OK

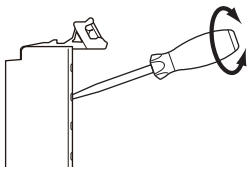


- When you insert a flat-blade screwdriver into a release hole, press it down with a force of 30 N max. Applying excessive force may damage the terminal block.
- Do not tilt or twist the flat-blade screwdriver while it is pressed into the release hole. Doing so may break the terminal block.

NG



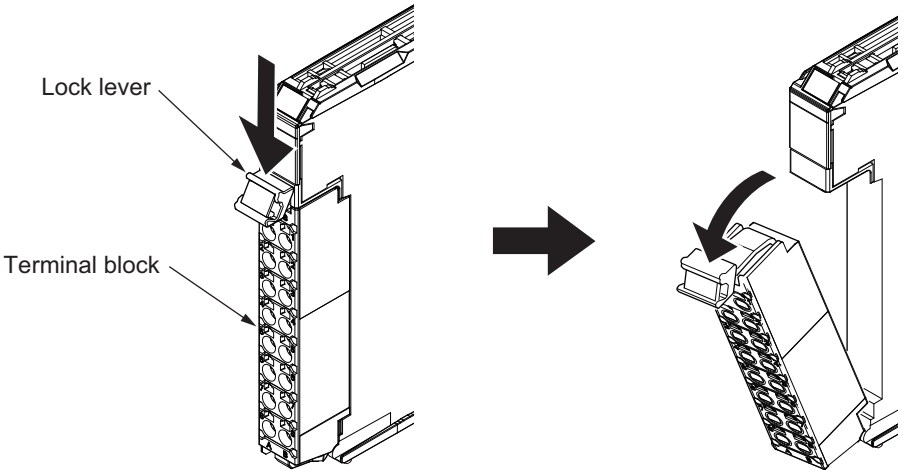
NG



- Make sure that all wiring is correct.
- Do not bend the cable forcibly. Doing so may sever the cable.

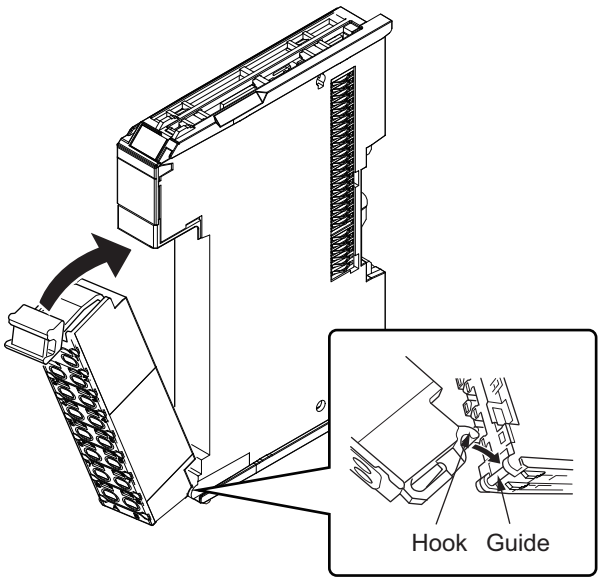
Removing a Terminal Block

1 Press the lock lever on the terminal block and pull out the top of the terminal block to remove it.



Attaching a Terminal Block

1 Place the terminal block hook on the guide at the bottom of the NX Unit and press in on the top of the terminal block to attach it.



Mount a Terminal Block that is applicable to each Unit model.

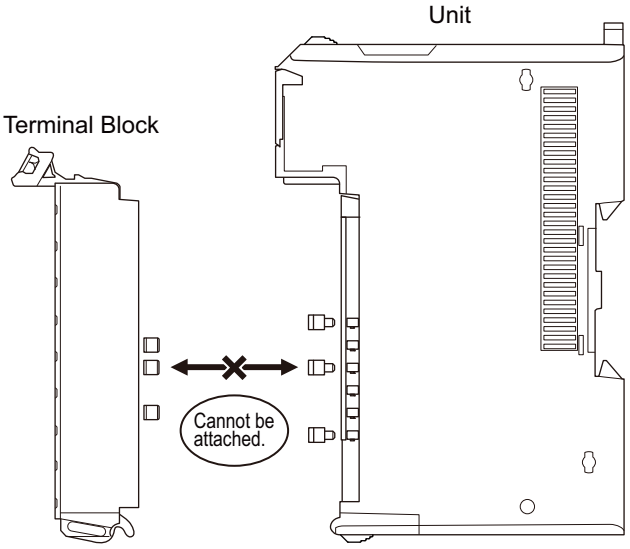
Refer to *Applicable Terminal Blocks for Each Unit Model* on page 3-5 for the applicable Terminal Blocks.

Preventing Incorrect Attachment of Terminal Blocks

In order to prevent unintentionally installing the wrong terminal block, you can limit the combination of a Unit and a terminal block.

Insert three Coding Pins (NX-AUX02) into three of the six incorrect attachment prevention holes on the Unit and on the terminal block. Insert these pins into positions so that they do not interfere with each other when the Unit and terminal block are connected to each other.

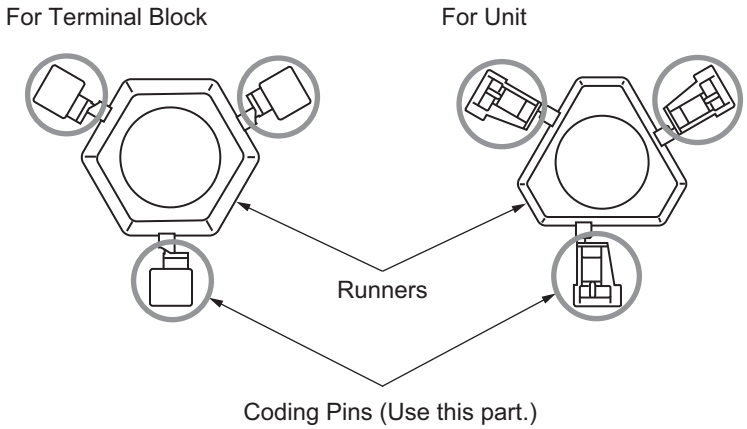
You can use these pins to create a combination in which the wrong terminal block cannot be attached because the pin patterns do not match.



Types of Coding Pins

There are two types of Coding Pins, both with their own unique shape: one for terminal blocks and one for Units.

Three pins come with each runner.



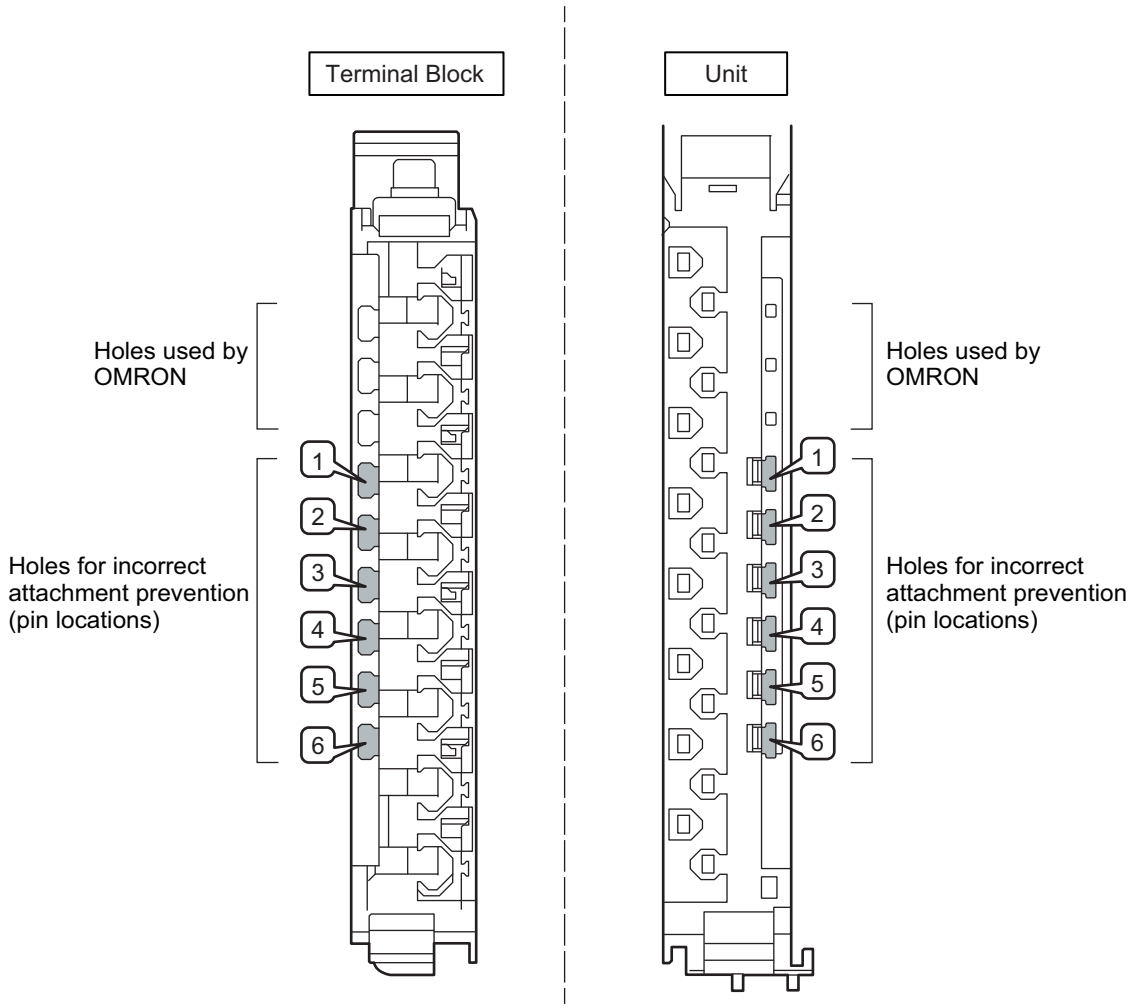
Use the following Coding Pins.

Name	Model	Specification
Coding Pin	NX-AUX02	For 10 Units (Terminal Block: 30 pins, Unit: 30 pins)

Insertion Locations and Patterns of Coding Pins

Insert three Coding Pins of each on the terminal block and on the Unit at the positions designated by the numbers 1 through 6 in the figure below.

As shown in the following table, there are 20 unique pin patterns that can be used.



○: Pin inserted

Pattern	Pin locations for Terminal Block						Pin locations for Unit					
	1	2	3	4	5	6	1	2	3	4	5	6
No.1	○	○	○							○	○	○
No.2	○	○		○					○		○	○
No.3	○	○			○				○	○		○
No.4	○	○				○			○	○	○	
No.5	○		○	○				○			○	○
No.6	○		○		○			○		○		○
No.7	○		○			○		○		○	○	
No.8	○			○	○			○	○			○
No.9	○			○		○		○	○		○	
No.10	○				○	○		○	○	○		
No.11		○	○	○			○				○	○
No.12		○	○		○		○			○		○
No.13		○	○			○	○			○	○	
No.14		○		○	○		○		○			○
No.15		○		○		○	○		○		○	
No.16		○			○	○	○		○	○		
No.17			○	○	○		○	○				○
No.18			○	○		○	○	○			○	
No.19			○		○	○	○	○		○		
No.20				○	○	○	○	○	○			

To make the maximum of 20 patterns, purchase two sets of NX-AUX02 Pins. (One set for 10 Units.)

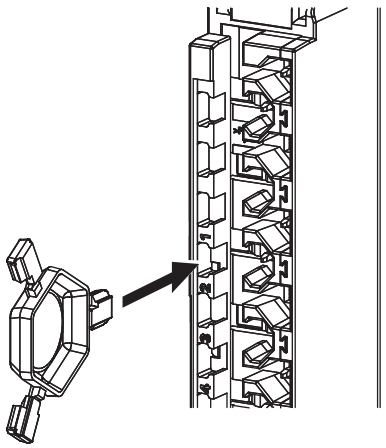
Precautions for Correct Use

- OMRON uses the holes other than No. 1 to 6 in the figure on the previous page. If you insert a Coding Pin into one of the holes used by OMRON on the terminal block side, this makes it impossible to mount the terminal block on a Unit.
- Do not use Coding Pins that have been attached and removed.

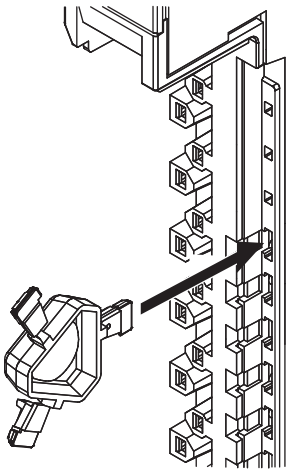
● Inserting the Coding Pins

1 Hold the pins by the runner and insert a pin into one of the incorrect attachment prevention holes on the terminal block or on the Unit.

Terminal Block

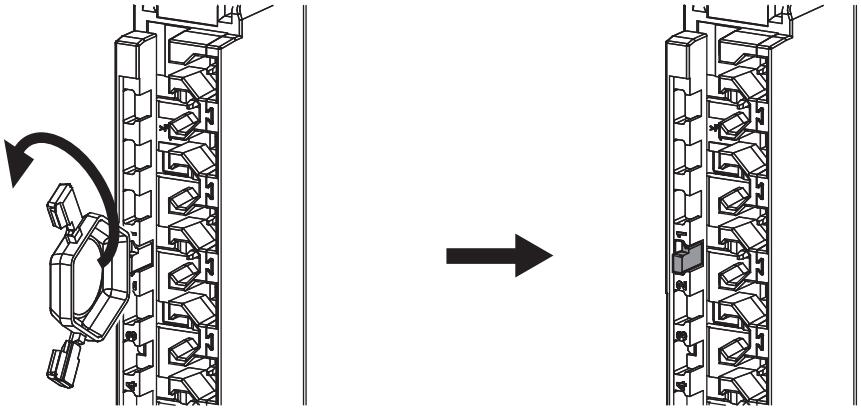


Unit

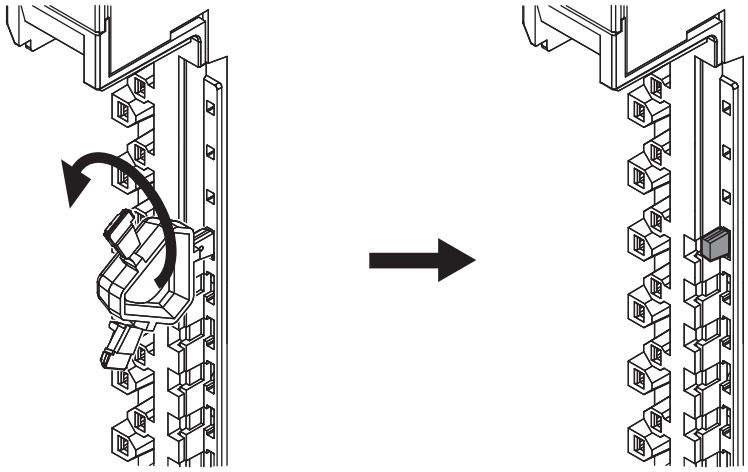


2 Rotate the runner to break off the Coding Pin.

Terminal Block



Unit



5

Troubleshooting

This section describes the error information and corrections for errors that can occur when the System Units are used.

5-1 How to Check for Errors 5-2

5-2 Checking for Errors with the Indicators 5-3

5-3 Checking for Errors and Troubleshooting on the Sysmac Studio 5-5

5-3-1 Checking for Errors from the Sysmac Studio 5-5

5-3-2 Event Codes and Corrections for Errors 5-8

5-3-3 Meaning of Error 5-9

5-4 Resetting Errors 5-11

5-5 Troubles Specific To Each Type of NX Units 5-12

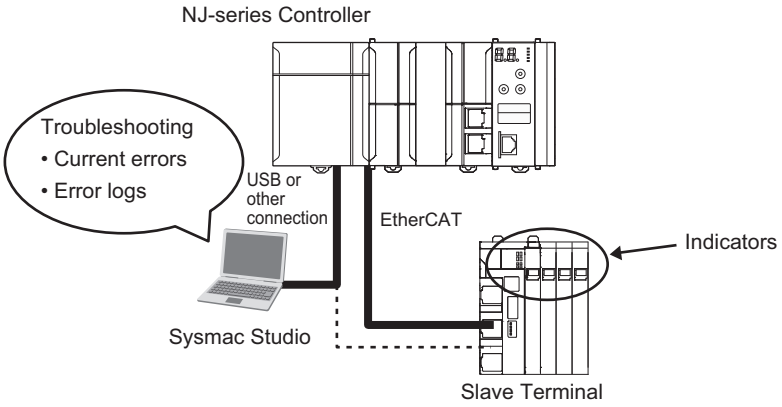
5-5-1 Additional NX Unit Power Supply Unit 5-12

5-5-2 Additional I/O Power Supply Unit 5-13

5-6 Troubleshooting Flowchart 5-14

5-1 How to Check for Errors

You can check the status of errors on the Slave Terminal with the following methods.



Checking method	What you can check
Checking the indicators	Status of Units and degree of error
Troubleshooting with Sysmac Studio	You can check for current Controller errors, a log of past Controller errors, error sources, error causes, and corrections.

Note With an NS-series PT, you can check on an error occurring in an EtherCAT Coupler Unit and some of the NX Units, and check which NX Unit the error occurred on.

If you use an NJ-series Controller, refer to the *NJ-series Troubleshooting Manual* (Cat. No. W503) for information on how to check for errors in the entire Controller.

5-2 Checking for Errors with the Indicators

You can use the TS indicators on the NX Units to check the NX Unit status and level of errors.

This section describes the meanings of errors that the TS indicator shows and the troubleshooting procedures for them.

In this section, the status of the indicator is indicated with the following abbreviations.

Abbreviation	Indicator status
Lit	Lit
Not Lit	Not lit
FS ( )	Flashing. The numeric value in parentheses is the flashing interval.
–	Undefined

Troubleshooting the Primary Errors

● All Units

TS indicator		Cause	Correction
Green	Red		
Lit	Not Lit	–	– (This is the normal status.)
FS (2 s)	Not Lit	• Initializing • Downloading	– (Normal. Wait until the processing is completed.)
Lit	Lit	This status is not present.	
Not Lit	Not Lit	The Unit power supply is not supplied.	Check the following items and supply the Unit power supply correctly. [Check items for power supply] • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.
		• Waiting for initialization to start • Restarting	- (Normal. Wait until the processing is completed.)
		If you cannot resolve the problem after you check the above items and cycle the Slave Terminal power supply, the Unit may have a hardware failure. If this happens, replace the Unit.	
Not Lit	Lit	Hardware failure	If this error occurs after you cycle the Slave Terminal power supply, replace the Unit.
Not Lit	Lit	Non-volatile Memory Hardware Error	Refer to Event *Non-volatile Memory Hardware Error* on page 5-10.
Not Lit	FS (1 s)	This status is not present	

● Additional NX Unit Power Supply Unit

UNIT PWR indicator Green	Cause	Correction
Lit	The Unit power supply is supplied.	- (This is the normal status.)
Not Lit	The Unit power supply is not supplied.	Check the following items and supply the Unit power supply correctly. [Check items for power supply] • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.

● Additional I/O Power Supply Unit

I/O PWR indicator Green	Cause	Correction
Lit	The I/O power supply is supplied.	- (This is the normal status.)
Not Lit	The I/O power supply is not supplied.	Check the following items and supply the Unit power supply correctly. [Check items for power supply] • Make sure that the power supply cable is wired correctly. • Make sure that the power supply cable is not disconnected. • Make sure that power supply voltage is within the specified range. • Make sure that the power supply has enough capacity. • Make sure that power supply has not failed.

5-3 Checking for Errors and Troubleshooting on the Sysmac Studio

Error management on the NX Series is based on the methods used for the NJ-series Controllers.

This allows you to use the Sysmac Studio to check the meanings of errors and troubleshooting procedures.

5-3-1 Checking for Errors from the Sysmac Studio

When an error occurs, you can place the Sysmac Studio online to the Controller or the Communications Coupler Unit to check current Controller errors and the log of past Controller errors.

The methods that are used to check errors depend on the Controller you use.

Controller used	Sysmac Studio connection	Scope of check	Remarks
NJ-series Controller	NJ-series CPU Unit	You can check the errors that are managed by the Controller. This includes errors for the connected EtherCAT Slave Terminals.	You cannot check errors if there is a fatal error in the CPU Unit.
	EtherCAT Coupler Unit	You can check the errors that are managed by the EtherCAT Coupler Unit. You can check errors in the EtherCAT Coupler Unit to which the Sysmac Studio is connected, and errors in the NX Units that are connected after the EtherCAT Coupler Unit.	• You can check errors in the Slave Terminals even if there is a fatal error in the CPU Unit. • You cannot check errors if there is a fatal error in the EtherCAT Coupler Unit. • Some errors in the NX Units cannot be checked if a fatal error occurs in that NX Unit.*1
Other controllers	EtherCAT Coupler Unit	Same as above.	Same as above.

*1. On NX Units that manage their own errors, current errors cannot be checked after a fatal error occurs in that NX Unit. On NX Units that record their own event logs, the error log cannot be checked after a fatal error occurs in that NX Unit.

Refer to the *NJ-series Troubleshooting Manual* (Cat. No. W503) for information on NJ-series error management methods.

Refer to the *NJ-Series Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for details on troubleshooting with the Sysmac Studio.

If you cannot check the error on the Sysmac Studio, check the error by following the flow outlined in *5-6 Troubleshooting Flowchart* on page 5-14.

Additional Information

Checking Errors in an EtherCAT Slave Terminal with an NS-series PT

You can use an NS-series PT to view current errors on the EtherCAT Coupler Unit errors and some of the NX Units as well as information on the NX Units in which current errors occurred. You cannot use it to check event logs and details on current errors in the NX Units.

Current Errors

Open the Sysmac Studio's Controller Error Tab Page to check the current error's level, source, source details, event name, event codes, details, attached information 1 to 4, and correction.

Errors in the observation level are not displayed.

Additional Information

Number of Current Errors

The following table gives the number of errors that are reported simultaneously as current errors in each Unit.

Unit	Number of simultaneous error notifications
EtherCAT Coupler Unit	128 errors
System Units	Since current errors are managed in the Communications Coupler Unit, the number of current errors is limited by the number of errors for the Communications Coupler Unit.

If the number of errors exceeds the maximum number of reportable current errors, errors are reported with a priority given to the oldest and highest-level errors. Errors that exceed the limit on simultaneous error notifications are not reported.

Errors that are not reported are still reflected in the error status.

Log of Past Errors

Open the Sysmac Studio's Controller Event Log Tab Page to check the times, levels, sources, source details, event names, event codes, details, attached information 1 to 4, and corrections for previous errors.

Additional Information

Number of Logs of Past Errors

Each event log can contain the following number of records. If the number of events exceeds the following number of records, the oldest events are overwritten.

Event logs in the Digital I/O Units are stored in the EtherCAT Coupler Unit.

Event log category	Types of Units	
	EtherCAT Coupler Unit	System Units
System event log	Total: 128 events	
Access event log	Total: 32 events	

Refer to the *NJ-series Troubleshooting Manual* (Cat. No. W503) and the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for the items that you can check and the procedures to check for errors.
Refer to *5-3-2 Event Codes and Corrections for Errors* on page 5-8 for details on event codes.

5-3-2 Event Codes and Corrections for Errors

The errors (i.e.,events) that occur in the System Units are shown below.

The following abbreviations are used in the event level column.

Abbreviation	Name
Maj	Major fault level
Prt	Partial fault level
Min	Minor fault level
Obs	Observation
Info	Information

Refer to the *NJ-series Troubleshooting Manual* (Cat. No. W503) for all NJ-series event codes.

Event code	Event name	Meaning	Assumed cause	Level					Reference
				Maj	Prt	Min	Obs	Info	
00200000 hex	Non-volatile Memory Hardware Error	An error occurred in non-volatile memory.	• Non-volatile memory failure			Yes			P. 5-10
90400000 hex	Event Log Cleared	The event log was cleared.	• The event log was cleared by the user.					Yes	P. 5-10

5-3-3 Meaning of Error

This section describes the information that is given for individual errors.

Error Descriptions

The items that are used to describe individual errors (events) are described in the following copy of an error table.

<table>
<tr><td>Event name</td><td colspan="3">Gives the name of the error.</td><td>Event code</td><td colspan="2">Gives the code of the error.</td></tr>
<tr><td>Meaning</td><td colspan="6">Gives a short description of the error.</td></tr>
<tr><td>Source</td><td colspan="2">Gives the source of the error.</td><td>Source details</td><td>Gives details on the source of the error.</td><td>Detection timing</td><td>Tells when the error is detected.</td></tr>
<tr><td>Error attributes</td><td>Level</td><td>Tells the level of influence on control.*1</td><td>Recovery</td><td>Gives the recovery method.*2</td><td>Log category</td><td>Tells which log the error is saved in.*3</td></tr>
<tr><td>Effects</td><td>User program</td><td>Tells what will happen to execution of the user program.*4</td><td>Operation</td><td colspan="3">Provides special information on the operation that results from the error.</td></tr>
<tr><td>Indicators</td><td colspan="6">Gives the status of the built-in EtherNet/IP port and built-in EtherCAT port indicators. Indicator status is given only for errors in the EtherCAT Master Function Module and the EtherNet/IP Function Module.</td></tr>
<tr><td rowspan="2">System-defined variables</td><td colspan="2">Variable</td><td>Data type</td><td colspan="3">Name</td></tr>
<tr><td colspan="6">Lists the variable names, data types, and meanings for system-defined variables that provide direct error notification, that are directly affected by the error, or that contain settings that cause the error.</td></tr>
<tr><td rowspan="2">Cause and correction</td><td colspan="2">Assumed cause</td><td>Correction</td><td colspan="3">Prevention</td></tr>
<tr><td colspan="6">Lists the possible causes, corrections, and preventive measures for the error.</td></tr>
<tr><td>Attached information</td><td colspan="6">This is the attached information that is displayed by the Sysmac Studio or an NS-series PT.</td></tr>
<tr><td>Precautions/ Remarks</td><td colspan="6">Provides precautions, restrictions, and supplemental information. If the user can set the event level, the event levels that can be set, the recovery method, operational information, and other information are also provided.</td></tr>
</table>

*1. One of the following:
Major fault: Major fault level
Partial fault: Partial fault level
Minor fault: Minor fault level
Observation
Information

*2. One of the following:
Automatic recovery: Normal status is restored automatically when the cause of the error is removed.
Error reset: Normal status is restored when the error is reset after the cause of the error is removed.
Cycle the power supply: Normal status is restored when the power supply to the Controller is turned OFF and then back ON after the cause of the error is removed.
Controller reset: Normal status is restored when the Controller is reset after the cause of the error is removed.
Depends on cause: The recovery method depends on the cause of the error.

*3. One of the following:
System: System event log
Access: Access event log

*4. One of the following:
Continues: Execution of the user program will continue.
Stops: Execution of the user program stops.
Starts: Execution of the user program starts.

Event name	Non-volatile Memory Hardware Error		Event code	00200000 hex	
Meaning	An error occurred in non-volatile memory.				
Source	Depends on where the Sysmac Studio is connected and the system configuration.	Source details	NX Unit	Detection timing	When power is turned ON to the NX Unit
Error attributes	Level	Minor fault	Recovery	Restart the Slave Terminal and then reset all errors in Controller.	Log category	System
Effects	User program	Continues.	Operation	I/O refreshing for the NX Unit stops. Messages cannot be sent to the NX Unit.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	Non-volatile memory failure		Replace the NX Unit.		None	
Attached information	None					
Precautions/ Remarks	None					

Event name	Event Log Cleared		Event code	90400000 hex	
Meaning	The event log was cleared.				
Source	Depends on where the Sysmac Studio is connected and the system configuration.	Source details	NX Unit	Detection timing	When commanded from user
Error attributes	Level	Information	Recovery	---	Log category	Access
Effects	User program	Continues.	Operation	Not affected.		
System-defined variables	Variable		Data type		Name	
	None		---		---	
Cause and correction	Assumed cause		Correction		Prevention	
	The event log was cleared by the user.		---		---	
Attached information	Attached information: Events that were cleared 1: The system event log was cleared. 2: The access event log was cleared.					
Precautions/ Remarks	None					

5-4 Resetting Errors

Current errors in a Slave Terminal are retained, unless you reset them, until you cycle the power supply or restart the Slave Terminal.

To reset errors, you must remove the cause of the current error. If you reset an error without removing the cause, the same error will occur again.

Precautions for Correct Use

Resetting the errors does not remove the cause of the error.

Always remove the cause of the error, and then reset the error.

You can use the following methods to reset errors in a Slave Terminal.

Method	Operation	Scope of error reset	Description
Commands from Sysmac Studio	Resetting Controller errors	All errors in the Controller	Reset the Controller error from the Troubleshooting Dialog Box on the Sysmac Studio.
		All errors in the Slave Terminal	Refer to the user's manual of the Communications Coupler Unit for details on resetting errors in the EtherCAT Slave Terminal.
		Errors for individually specified NX Units	
	Clearing all memory for the Slave Terminal	All errors in the Slave Terminal	If the causes for the Controller errors are removed, all Controller errors in the Slave Terminals are reset.
	Restarting Slave Terminals		
Commands from the user program	Resetting Controller errors in the EtherCAT Master Function Module	All errors in the EtherCAT Master Function Module	Execute the Reset EtherCAT Error (ResetECError) instruction in the user program of the NJ-series Controller.
Cycling the Unit power supply to the Slave Terminal	---	All errors in the Slave Terminal	If the causes for the Controller errors are removed, all Controller errors in the Slave Terminals are reset.

Note On the NS-Series PT, you can only reset all errors for the entire Controller.

Refer to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504-E1-07 or later) for Sysmac Studio operating procedures.

For details on the Reset EtherCAT Error (ResetECError) instruction, refer to the *NJ-series Instructions Reference Manual* (Cat. No. W502).

5-5 Troubles Specific To Each Type of NX Units

5-5-1 Additional NX Unit Power Supply Unit

Problem	Assumed cause	Correction
The UNIT PWR indicator is not lit.	The Unit power is not supplied.	Check that the Unit power is supplied.
	The Unit power supply voltage is outside the specified range.	Set the Unit power supply voltage within the specified range.
	Wiring with the Unit power supply is incorrect.	Check the wiring with the Unit power supply.
	Wiring with the Unit power supply is disconnected.	Check the wiring with the Unit power supply.
	The terminal block is loose.	Check the installation of the terminal block.
	The Unit power supply is defective.	Replace the Unit power supply.
	The NX Unit power consumption exceeds the power supply capacity of the Additional NX Unit Power Supply Unit.	Add an Additional NX Unit Power Supply Unit.
Even though the UNIT PWR indicator is lit, the indicators of NX Units on the right are not lit.	Either this NX Unit or the NX Unit on the right is not installed correctly.	Check the NX Units are installed correctly.

5-5-2 Additional I/O Power Supply Unit

Problem	Assumed cause	Correction
The I/O PWR indicator is not lit.	The I/O power is not supplied.	Check that the I/O power is supplied.
	The I/O power supply voltage is outside the specified range.	Set the I/O power supply voltage within the specified range.
	Wiring with the connected device is incorrect.	Check the wiring with the connected device.
	A connected device is disconnected.	Check the wiring with the connected device.
	The terminal block is loose.	Check the installation of the terminal block.
	A connected device is defective.	Replace the connected device.
Even though the external power supply is turned ON, the I/O PWR indicator is not lit.	The I/O power supply voltage is outside the specified range.	Set the I/O power supply voltage within the specified range.
	Wiring with the connected device is incorrect.	Check the wiring with the connected device.
	Wiring to the terminal block is loose.	Check the wiring to the terminal block.
	A connected device is disconnected.	Check the wiring with the connected device.
	The terminal block is loose.	Check the installation of the terminal block.
	A connected device is defective.	Replace the connected device.
Even though the I/O PWR indicator is lit, the indicators of NX Units on the right are not lit.	Either this NX Unit or the NX Unit on the right is not installed correctly.	Check the NX Units are installed correctly.

5-6 Troubleshooting Flowchart

Refer to the *NX-series EtherCAT Coupler Unit User's Manual* (Cat. No. W519) for information on the standard troubleshooting flowcharts.

6

Inspection and Maintenance

This section describes how to clean, inspect, and maintain the system.

6-1 Cleaning and Inspection 6-2
6-1-1 Cleaning 6-2
6-1-2 Periodic Inspection 6-2
6-2 Maintenance Procedures 6-5
6-2-1 Backing Up Data 6-5
6-2-2 Replacement Procedure for NX Units 6-6

6-1 Cleaning and Inspection

This section describes daily device maintenance such as cleaning and inspection.

Make sure to perform daily or periodic inspections in order to maintain the System Unit's functions in the best operating condition.

6-1-1 Cleaning

Perform the following cleaning procedures periodically to ensure the System Units are maintained in the best operating condition.

- Wipe the equipment over with a soft, dry cloth when performing daily cleaning.
- If dirt remains even after wiping with a soft, dry cloth, wipe with a cloth that has been wet with a sufficiently diluted detergent (2%) and wrung dry.
- Units will become stained if items such as rubber, vinyl products, or adhesive tape are left on the NX Unit for a long period. Remove such items during regular cleaning.

Precautions for Correct Use

- Never use benzene, thinners, other volatile solvents, or chemical cloths.
- Do not touch the NX bus connectors.

6-1-2 Periodic Inspection

NX Units do not have parts with a specific life. However, its elements can deteriorate under improper environmental conditions. Periodic inspections are thus required to ensure that the required conditions are being maintained.

Inspection is recommended at least once every six months to a year, but more frequent inspections may be necessary depending on the severe environments.

Take immediate steps to correct the situation if any of the conditions in the following table are not met.

Periodic Inspection Items

No.	Inspection item	Inspection details	Criteria	Corrective action
1	External power supply	Is the power supply voltage measured at the terminal block within standards?	Within the power supply voltage range	Use a voltage tester to check the power supply at the terminals. Take necessary steps to bring the power supply within the power supply voltage range.
2	I/O power supply	Is the power supply voltage measured at the I/O terminal block within standards?	Voltages must be within I/O specifications of each NX Unit.	Use a voltage tester to check the power voltage at the terminals. Take necessary steps to bring the I/O power supply within NX Unit standards.
3	Ambient environment	Is the ambient operating temperature within standards?	0 to 55°C	Use a thermometer to check the temperature and ensure that the ambient operating temperature remains within the allowed range of 0 to 55°C.
		Is the ambient operating humidity within standards?	Relative humidity must be 10% to 95% with no condensation.	Use a hygrometer to check the humidity and ensure that the ambient operating humidity remains between 10% and 95%. Make sure that condensation does not occur due to rapid changes in temperature.
		Is it subject to direct sunlight?	Not in direct sunlight	Protect the Controller if necessary.
		Is there an accumulation of dirt, dust, salt, metal powder, etc.?	No accumulation	Clean and protect the Controller if necessary.
		Is there water, oil, or chemical sprays hitting the Controller?	No spray	Clean and protect the Controller if necessary.
		Are there corrosive or flammable gases in the area of the Controller?	No spray	Check by smell or use a sensor.
		Is the Unit subject to shock or vibration?	Vibration resistance and shock resistance must be within specifications.	Install cushioning or other vibration and shock absorbing equipment if necessary.
		Are there noise sources near the Controller?	No significant noise sources	Either separate the Controller and noise source, or protect the Controller.
4	Installation and wiring	Are the DIN track mounting hooks for each NX Unit securely locked?	No looseness	Securely lock the DIN track mounting hooks.
		Are the cable connectors fully inserted and locked?	No looseness	Correct any improperly installed connectors.
		Are there any loose screws on the track End Plates (PFP-M)?	No looseness	Tighten loose screws with a Phillips-head screwdriver.
		Are the NX Units connected to each other along the hookup guides and until they touch the DIN track?	You must connect and fix the NX Units to the DIN track.	Connect the NX Units to each other along the hookup guides and until they touch the DIN track.
		Are there any damaged external wiring cables?	No visible damage	Check visually and replace cables if necessary.

Tools Required for Inspections

Required Tools

- Phillips screwdriver
- Flat-blade screwdriver
- Voltage tester or digital voltmeter
- Industrial alcohol and pure cotton cloth

Tools Required Occasionally

- Oscilloscope
- Thermometer and hygrometer

6-2 Maintenance Procedures

This section describes the procedures for backing up the data in the EtherCAT Coupler Unit, and how to replace the EtherCAT Coupler Unit.

6-2-1 Backing Up Data

Perform backups so that you can restore the EtherCAT Coupler Unit to its original state in the event of a failure or other problem.

The target data to back up on the EtherCAT Coupler Unit are listed below.

- Unit configuration information
- I/O allocation information
- Unit operation settings
- Hardware switch information
- Production information

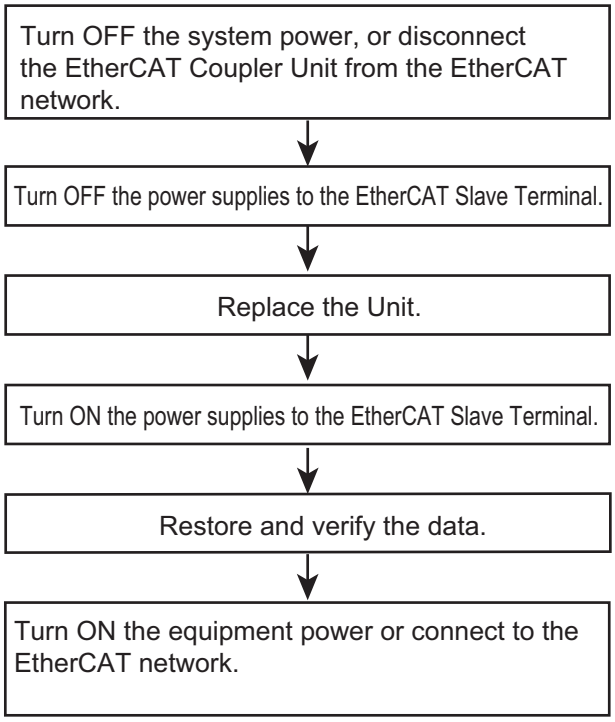
Precautions for Correct Use

The backup data for the EtherCAT Coupler Unit includes data for NX Units that store their settings in the EtherCAT Coupler Unit. If you replace the EtherCAT Coupler Unit, you must restore this data to restore the settings for these NX Units.

Refer to the user's manual of the Communications Coupler Unit for backup methods, and to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for the backup procedures.

6-2-2 Replacement Procedure for NX Units

This section describes the basic replacement procedures for the NX Units that are mounted after the EtherCAT Coupler Unit.


Turn OFF the system power, or disconnect the EtherCAT Coupler Unit from the EtherCAT network.
Turn OFF the power supplies to the EtherCAT Slave Terminal.
Replace the Unit.
Turn ON the power supplies to the EtherCAT Slave Terminal.
Restore and verify the data.
Turn ON the equipment power or connect to the EtherCAT network.

1 Turn OFF the power supply to all of the equipment or disconnect the EtherCAT Slave Terminal that includes the NX Unit to replace from the EtherCAT network.

2 Turn OFF the Unit power supplies and I/O power supplies for the EtherCAT Slave Terminal.

3 Replace the NX Unit. If the NX Unit has hardware switches, set the hardware switches to the same settings as on the original NX Unit.

4 Turn ON the Unit power supplies and I/O power supplies to the EtherCAT Slave Terminal.

5 Restore and verify data for the new NX Unit.

6 Turn ON the power supply to all of the equipment, or connect the EtherCAT Slave Terminal to the EtherCAT network.

Precautions for Correct Use

Checking the Serial Numbers of NX Units

If the Serial Number Check Method setting on the EtherCAT Coupler Unit is set to *Setting* = *Actual device*, temporarily change this setting to *None*, and then replace the NX Unit. Get the serial number of the new NX Unit, and then set the Serial Number Check Method setting on the EtherCAT Coupler Unit to *Setting* = *Actual device* again.
If you replace the NX Unit with the Serial Number Check Method setting set to *Setting* = *Actual device*, a Unit Configuration Verification Error will occur.

Refer to the user's manual of the Communications Coupler Unit for details on the Serial Number Check Method setting for the EtherCAT Coupler Unit.

Additional Information

- Refer to the *4-1 Installing NX Units* on page 4-2 for the procedures to mount and remove the NX Unit.
- Refer to the *NJ-series CPU Unit Built-in EtherCAT Port User's Manual* (Cat. No. W505) for the procedures to disconnect and connect the EtherCAT Coupler Unit from and to the EtherCAT network.
- Refer to *NJ-series CPU Unit Software User's Manual* (Cat. No. W501-E1-06 or later) for the procedures for restoring and comparing data.

A

Appendices

This section describes the data sheets of the System Units and their dimensions.

A-1 Data Sheet A-2
A-1-1 Model List A-2
A-1-2 Additional NX Unit Power Supply Unit A-3
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A-3-1 Format of Object Descriptions A-17
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A-1 Data Sheet

The specifications of individual System Units are shown below.

A-1-1 Model List

Additional NX Unit Power Supply Unit

Model	Rated power supply voltage	NX Unit power supply capacity	Reference
NX-PD1000	24 VDC	10 W max.	P. A-4

Additional I/O Power Supply Unit

Model	Rated power supply voltage	Maximum current of I/O power supply	Reference
NX-PF0630	5 to 24 VDC	4 A	P. A-7
NX-PF0730	5 to 24 VDC	10 A	P. A-8

I/O Power Supply Connection Unit

Model	Number of I/O power supply terminals	Current capacity of I/O power supply terminal	Reference
NX-PC0020	IOV: 16 terminals	4 A/terminal max.	P. A-10
NX-PC0010	IOG: 16 terminals		P. A-11
NX-PC0030	IOV: 8 terminals IOG: 8 terminals		P. A-12

Shield Connection Unit

Model	Number of shield terminals	Reference
NX-TBX01	14 terminals	P. A-14

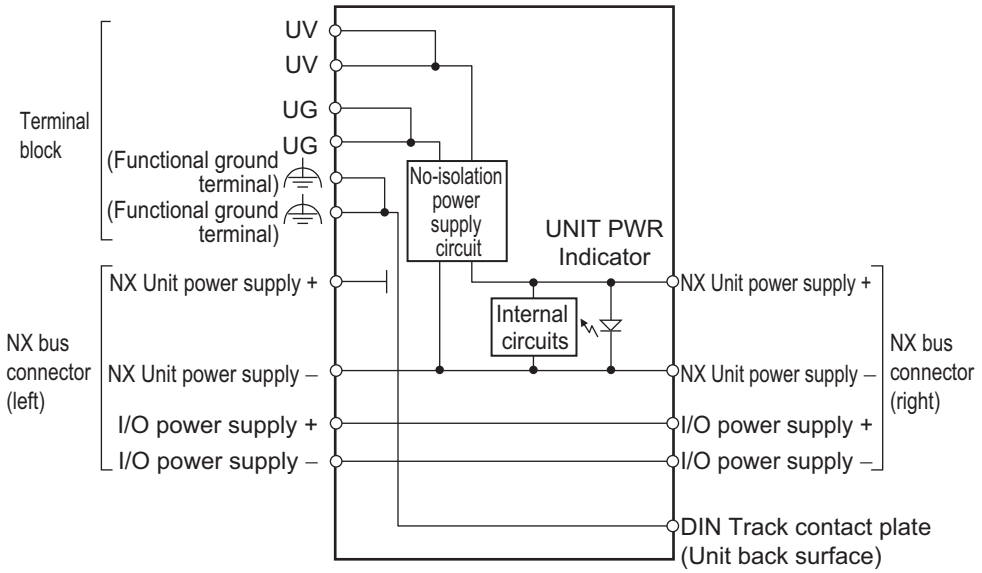
A-1-2 Additional NX Unit Power Supply Unit

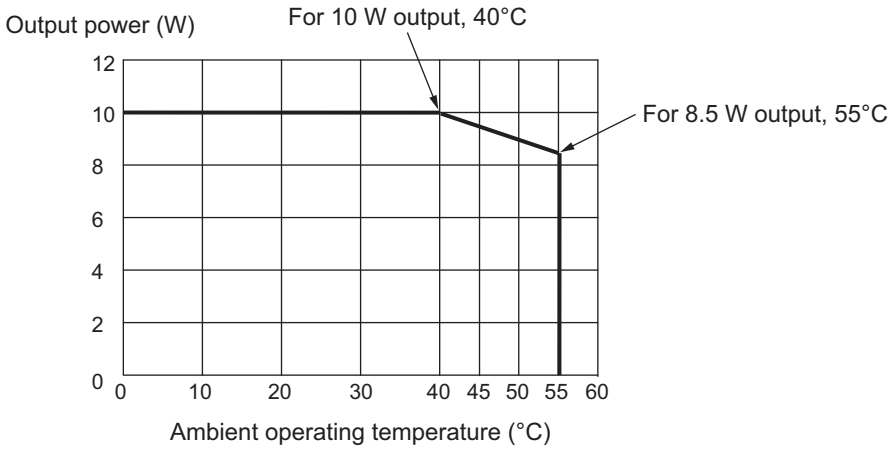
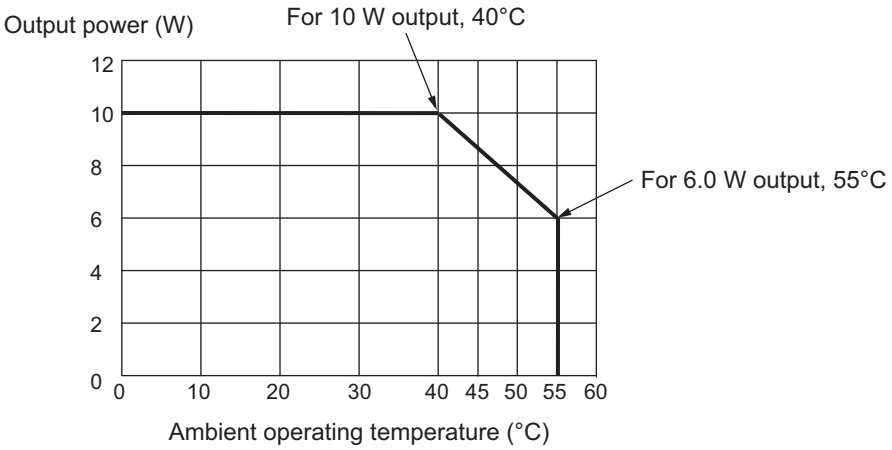
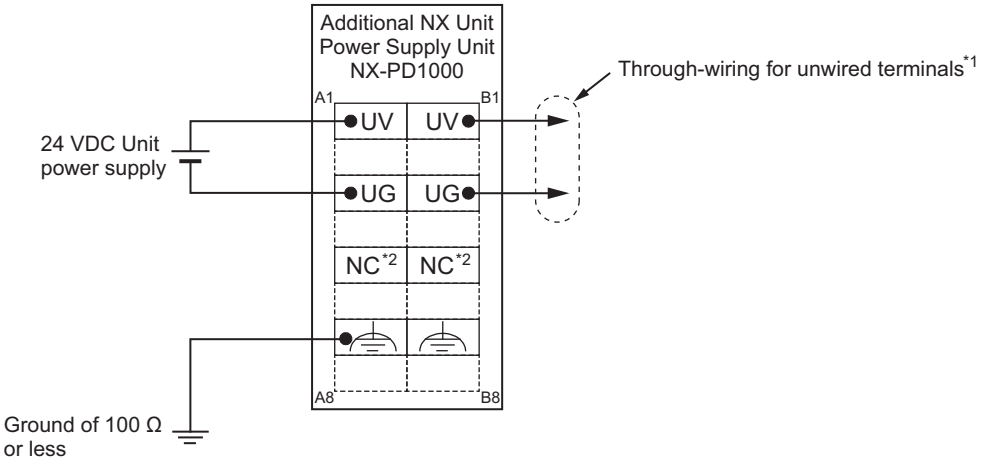
Description of Items on the Data Sheet of the Additional NX Unit Power Supply Unit

The meanings of the items on the data sheet of the Additional NX Unit Power Supply Unit are explained in the table below.

Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Power supply voltage	The rated voltage and voltage range that are supplied to the Unit.
NX Unit power supply capacity	The amount of power that the Unit can supply to the NX Units.
NX Unit power supply efficiency	The efficiency of the power supply circuit.
Current capacity of power supply terminal	The current capacity of the Unit power supply terminal (UV/UG). When you supply the Unit power to the connected external devices, do not allow the total of the current consumed by its own block and the current supplied to external to exceed this value.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the NX Unit power supply and Unit power supply terminals of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of the Slave Terminal including the Unit, and the details of restrictions on the specifications due to the installation orientation.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.

Additional NX Unit Power Supply Unit (Screwless Clamping Terminal Block, 12 mm Width)

Unit name	Additional NX Unit Power Supply Unit
Model	NX-PD1000
External connection terminals	Screwless clamping terminal block (8 terminals)
Power supply voltage	24 VDC (20.4 to 28.8 VDC)
NX Unit power supply capacity	10 W max. (Refer to *Installation orientation and restrictions* for details.)
NX Unit power supply efficiency	70%
Current capacity of power supply terminal	4 A max. (including the current of through-wiring)
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	

Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: • For upright installation  • For any installation other than upright 
Terminal connection diagram	

*1. You can use the unwired terminals of the Unit power supply terminals (UV/UG) for through-wiring of the Additional NX Unit Power Supply Unit or the Unit power supply terminals on the EtherCAT Coupler Unit.

*2. The NC terminals are not connected to the internal circuits.

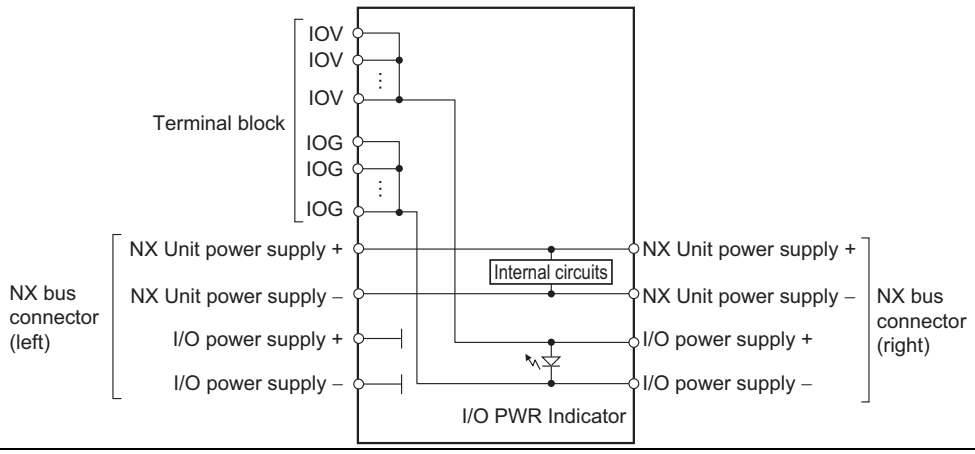
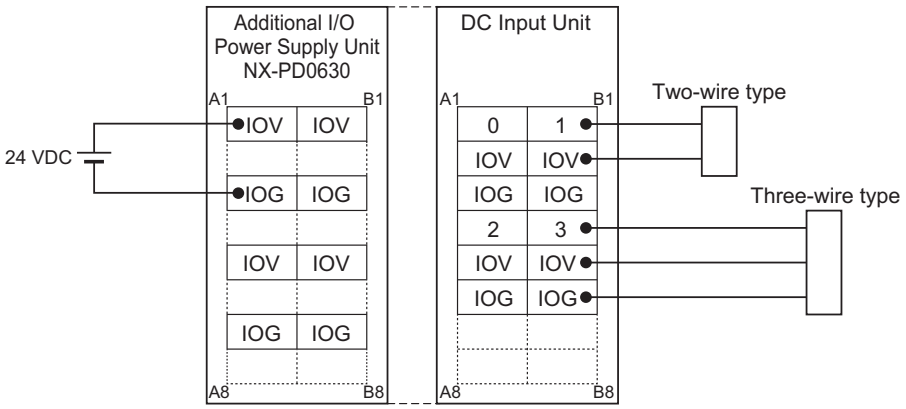
A-1-3 Additional I/O Power Supply Unit

Description of Items on the Data Sheet of the Additional I/O Power Supply Unit

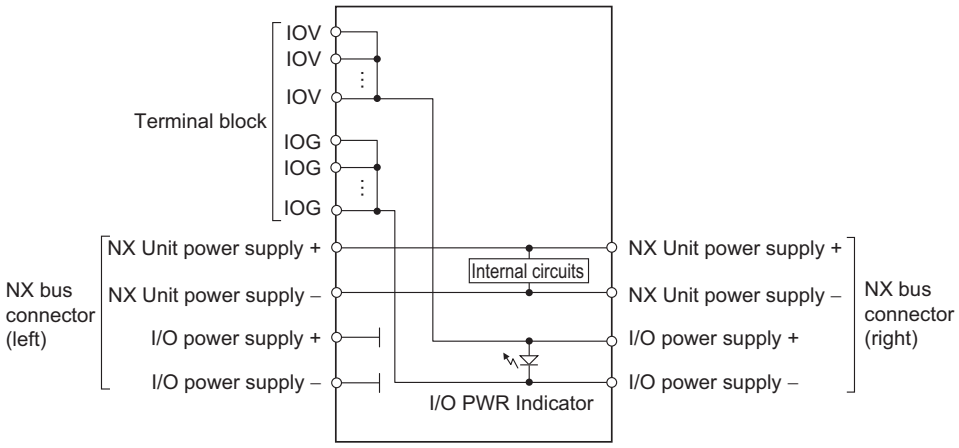
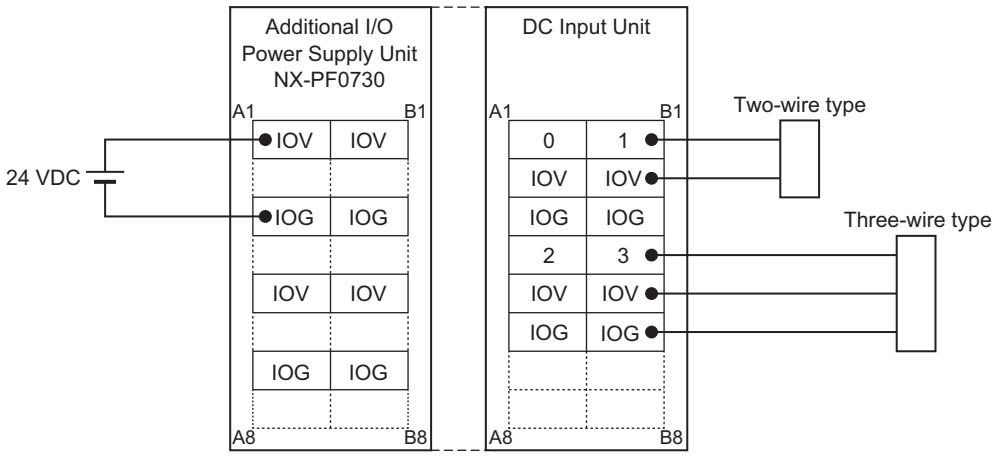
The meanings of the items on the data sheet of the Additional I/O Power Supply Unit are explained in the table below.

Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Power supply voltage	The rated voltage and voltage range of the I/O power supply that is supplied to the Unit.
Maximum current of I/O power supply	The maximum value of the current that can be supplied to the Units from the I/O power supply to be connected to the Unit through the NX bus connectors.
Current capacity of I/O power supply terminal	The current capacity of I/O power supply terminals of the Unit.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the I/O power supply terminal and internal I/O power supply of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of the Slave Terminal including the Unit, and the details of restrictions on the specifications due to the installation orientation.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.
Overload/low voltage detection	The function of the Unit to detect an overload and low voltage in the I/O power supply.
Protective function	The protective function that the Unit has.

Additional I/O Power Supply Units (Screwless Clamping Terminal Block, 12 mm Width)

Unit name	Additional I/O Power Supply Unit
Model	NX-PF0630
External connection terminals	Screwless clamping terminal block (8 terminals)
Power supply voltage	5 to 24 VDC (4.5 to 28.8 VDC)*1
Maximum current of I/O power supply	4 A
Current capacity of I/O power supply terminal	4 A max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	10 mA max.
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions
Terminal connection diagram	
Overload/low voltage detection	Not supported.
Protective function	Not supported.

*1. Use a voltage that is appropriate for the I/O circuits of the NX Units and the connected external devices.

Unit name	Additional I/O Power Supply Unit
Model	NX-PF0730
External connection terminals	Screwless clamping terminal block (8 terminals)
Power supply voltage	5 to 24 VDC (4.5 to 28.8 VDC)*1
Maximum current of I/O power supply	10 A
Current capacity of I/O power supply terminal	• A1 and A3: 10 A max. • A5, A7, B1, B3, B5 and B7: 4 A max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 10 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	10 mA max.
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions
Terminal connection diagram	
Overload/low voltage detection	Not supported.
Protective function	Not supported.

*1. Use a voltage that is appropriate for the I/O circuits of the NX Units and the connected external devices.

A-1-4 I/O Power Supply Connection Unit

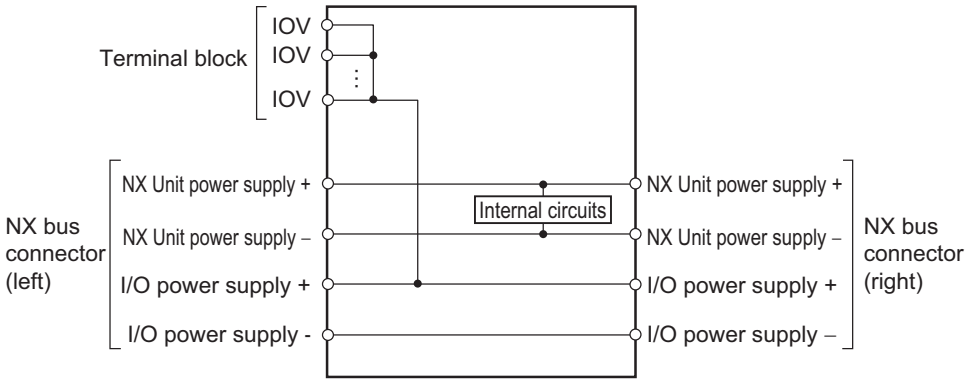
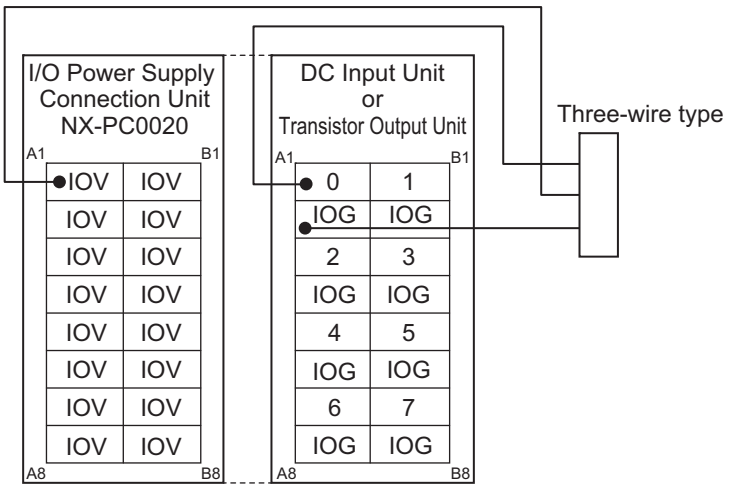
Description of Items on the Data Sheet of the I/O Power Supply Connection Unit

The meanings of the items on the data sheet of the I/O Power Supply Connection Unit are explained in the table below.

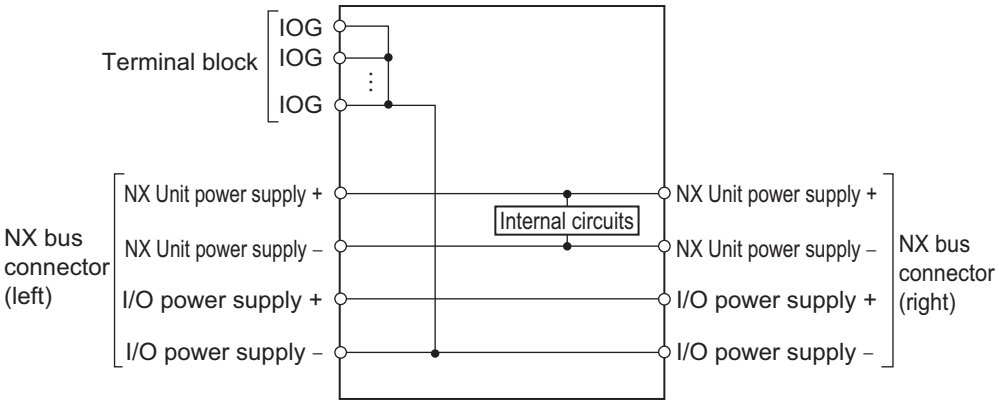
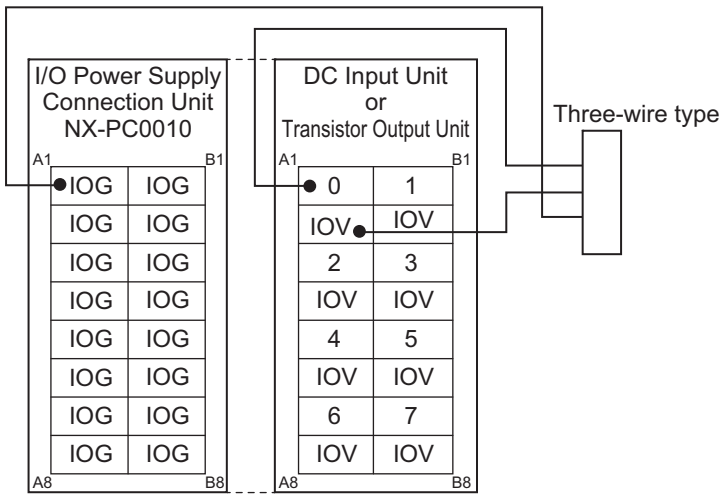
Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Number of I/O power supply terminals	The type (IOV/IOG) and number of I/O power supply terminals of the Unit.
Current capacity of I/O power supply terminal	The current capacity of I/O power supply terminals of the Unit.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the I/O power supply terminal and internal I/O power supply of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of the Slave Terminal including the Unit, and the details of restrictions on the specifications due to the installation orientation.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.

I/O Power Supply Connection Unit (Screwless Clamping Terminal Block, 12 mm Width)

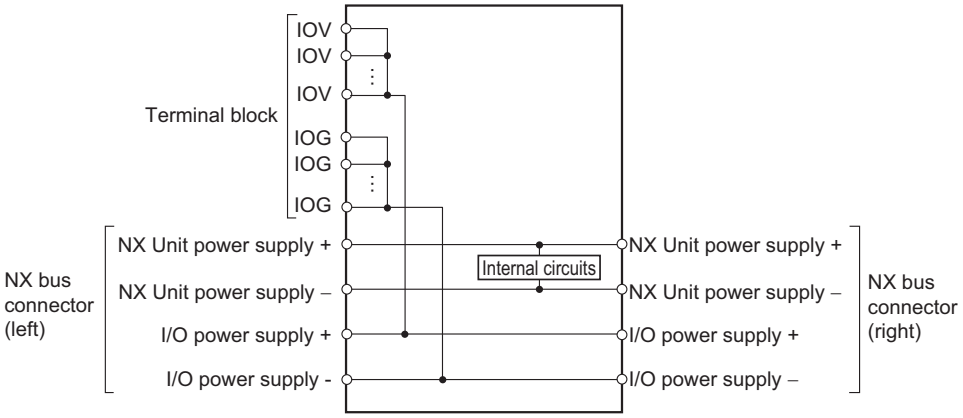
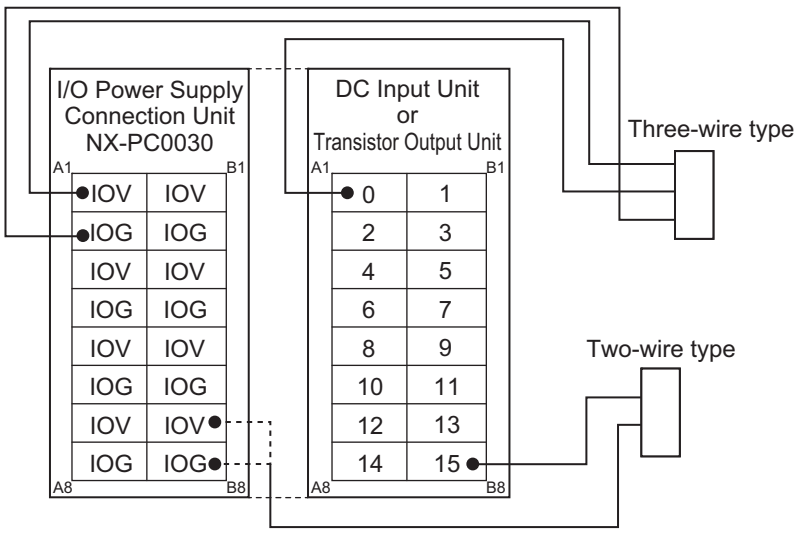
● IOV Terminal Type

Unit name	I/O Power Supply Connection Unit
Model	NX-PC0020
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of I/O power supply terminals	IOV: 16 terminals
Current capacity of I/O power supply terminal	4 A/terminal max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions
Terminal connection diagram	

● IOG Terminal Type

Unit name	I/O Power Supply Connection Unit
Model	NX-PC0010
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of I/O power supply terminals	IOG: 16 terminals
Current capacity of I/O power supply terminal	4 A/terminal max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions
Terminal connection diagram	

● IOV/IOG Terminal Type

Unit name	I/O Power Supply Connection Unit
Model	NX-PC0030
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of I/O power supply terminals	IOV: 8 terminals IOG: 8 terminals
Current capacity of I/O power supply terminal	4 A/terminal max.
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions
Terminal connection diagram	

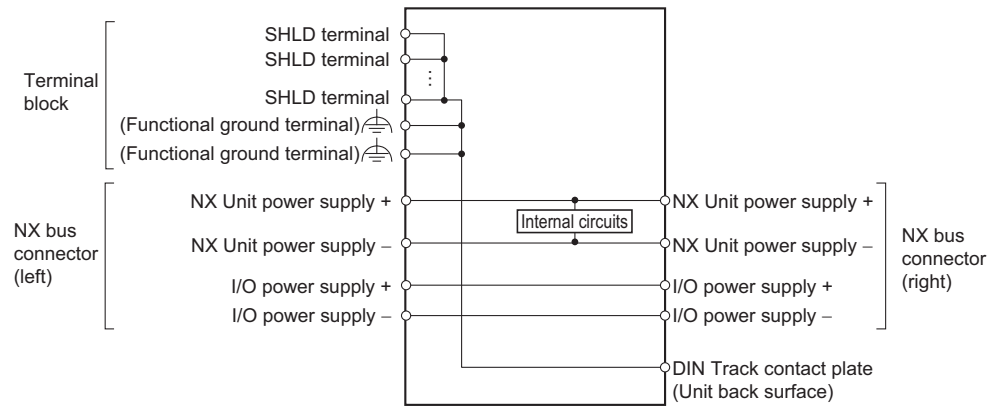
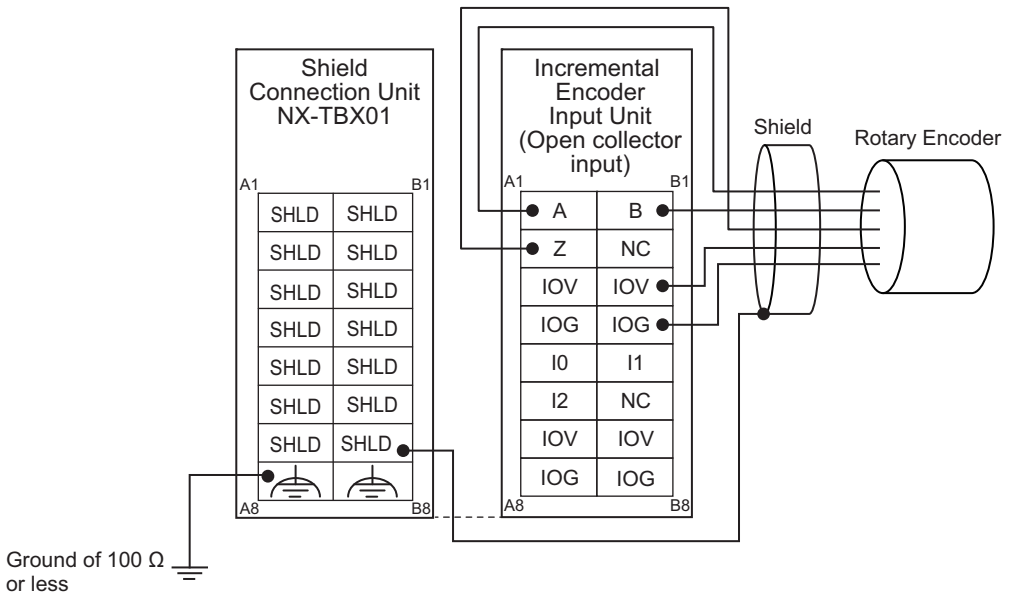
A-1-5 Shield Connection Unit

Description of Items on the Data Sheet of the Shield Connection Unit

The meanings of the items on the data sheet of the Shield Connection Unit are explained in the table below.

Item	Description
Unit name	The name of the Unit.
Model	The model of the Unit.
External connection terminals	The type of terminal block and connector that is used for connecting the Unit. The number of terminals on the terminal block is also described when a screwless clamping terminal block is used.
Number of shield terminals	The number of terminals of the SHLD terminal of the Unit.
Dimensions	The dimensions of the Unit. They are described as W × H × D. The unit is "mm".
Isolation method	The isolation method between the SHLD terminal, functional ground terminal, and internal circuit of the Unit.
Insulation resistance	The insulation resistance between the external connection terminals and internal circuit of the Unit.
Dielectric strength	The dielectric strength between the external connection terminals and internal circuit of the Unit.
NX Unit power consumption	The power consumption of the NX Unit power supply of the Unit.
Current consumption from I/O power supply	The current consumption from I/O power supply of the Unit.
Weight	The weight of the Unit.
Circuit layout	The circuit layout of the Unit.
Installation orientation and restrictions	The installation orientation of the Slave Terminal including the Unit, and the details of restrictions on the specifications due to the installation orientation.
Terminal connection diagram	A diagram of the connection between the Unit and connected external devices. When an I/O Power Supply Connection Unit or a Shield Connection Unit is required to be connected to the connected external devices, the description for such is included.

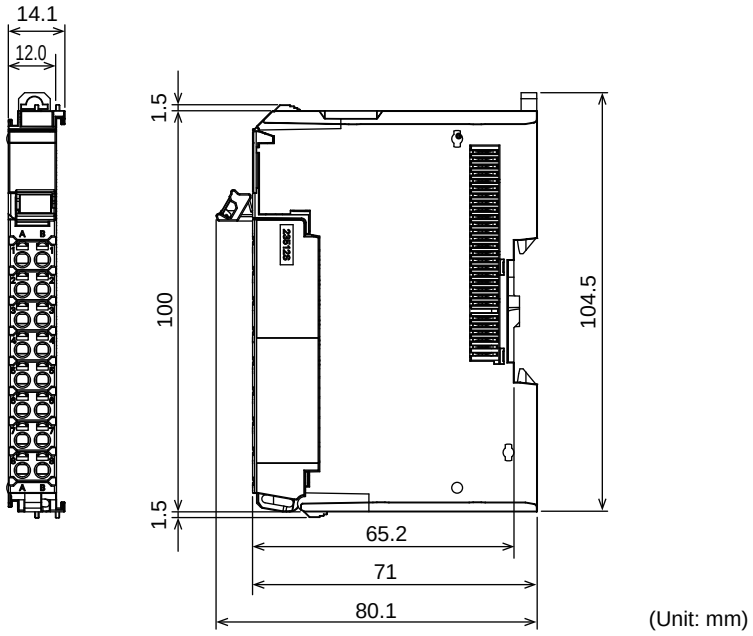
Shield Connection Unit (Screwless Clamping Terminal Block, 12 mm Width)

Unit name	Shield Connection Unit
Model	NX-TBX01
External connection terminals	Screwless clamping terminal block (16 terminals)
Number of shield terminals	14 terminals (The following two terminals are functional ground terminals.)
Dimensions	12 (W) × 100 (H) × 71 (D)
Isolation method	Isolation between the SHLD functional ground terminal, and internal circuit: No-isolation
Insulation resistance	20 MΩ min. between isolated circuits (at 100 VDC)
Dielectric strength	510 VAC between isolated circuits for 1 minute at a leakage current of 5 mA max.
NX Unit power consumption	0.45 W max.
Current consumption from I/O power supply	No consumption
Weight	65 g max.
Circuit layout	
Installation orientation and restrictions	Installation orientation: Possible in 6 orientations. Restrictions: No restrictions
Terminal connection diagram	

A-2 Dimensions

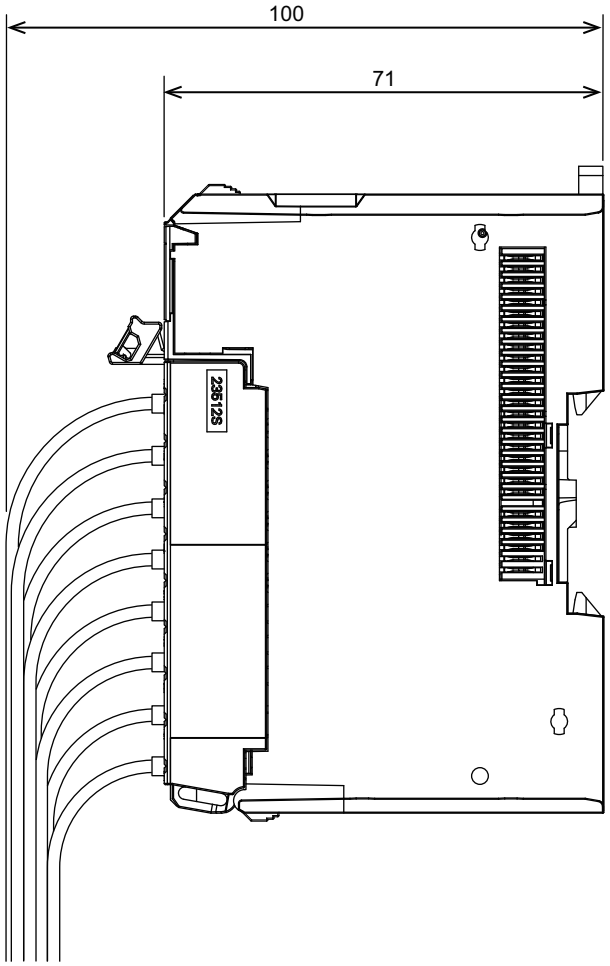
A-2-1 Additional NX Unit Power Supply Unit, Additional I/O Power Supply Unit, I/O Power Supply Connection Unit, and Shield Connection Unit

12 mm Width



(Unit: mm)

Installation Height



(Unit: mm)

A-3 List of NX Objects

A-3-1 Format of Object Descriptions

In this manual, NX objects are described with the following format.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute

Index (Hex)	:	This is the index of the NX object that is expressed as a four-digit hexadecimal number.
Subindex (Hex)	:	This is the subindex of the NX object that is expressed as a two-digit hexadecimal number.
Object name	:	This is the name of the object. For a subindex, this is the name of the subindex.
Default value	:	This is the value that is set by default.
Data range	:	For a read-only (RO) NX object, this is the range of the data you can read. For a read-write (RW) NX object, this is the setting range of the data.
Unit	:	The unit is the physical units.
Data type	:	This is the data type of the object.
Access	:	This data tells if the object is read-only or read/write. RO: Read only RW: Read/write
I/O allocation	:	This tells whether I/O allocation is allowed.
Data attribute	:	This is the timing when changes to writable NX objects are enabled. Y: Enabled by restarting N: Enabled at all times –: Write-prohibited

A-3-2 System Units

Unit Information Objects

This object gives the product information.

Index (hex)	Subindex (hex)	Object name	Default value	Data range	Unit	Data type	Access	I/O allocation	Data attribute
1000	–	NX Bus Identify	–	–	–	–	–	–	–
	00	Number of Entries	7	7	–	USINT	RO	Not possible	–
	02	Model	*1	–	–	ARRAY [0..11] OF BYTE	RO	Not possible	–
	03	Device Type	*2	–	–	UDINT	RO	Not possible	–
	04	Product Code	*3	–	–	UDINT	RO	Not possible	–
	05	Vendor Code	00000001 hex *4	–	–	UDINT	RO	Not possible	–
	06	Unit Version	*5	–	–	UDINT	RO	Not possible	–
	07	Serial Number	*6	00000000 to FFFFFFFF hex	–	UDINT	RO	Not possible	–
1001	–	Production Info	–	–	–	–	–	–	–
	00	Number of Entries	2	2	–	USINT	RO	Not possible	–
	01	Lot Number	*7	00000000 to FFFFFFFF hex	–	UDINT	RO	Not possible	–
	02	Hardware Version	*8	–	–	ARRAY [0..19] OF BYTE	RO	Not possible	–

*1. The product models are assigned in ascending order from the lowest number of array elements. Any remainder elements are filled with spaces.

*2. The device types are assigned for each product Unit type.
Bits 0 to 31: Device type

*3. The product codes are assigned for each product model.
Bits 0 to 31: Product code

*4. OMRON vendor code

*5. Bits 24 to 31: Integer part of the Unit version.
Bits 16 to 23: Fractional part of the Unit version.
Bits 0 to 15: Reserved
(Example) For Ver.1.0, 0100□□□□ hex

*6. A unique serial number is assigned for each product unit.
Bits 0 to 31: Serial number

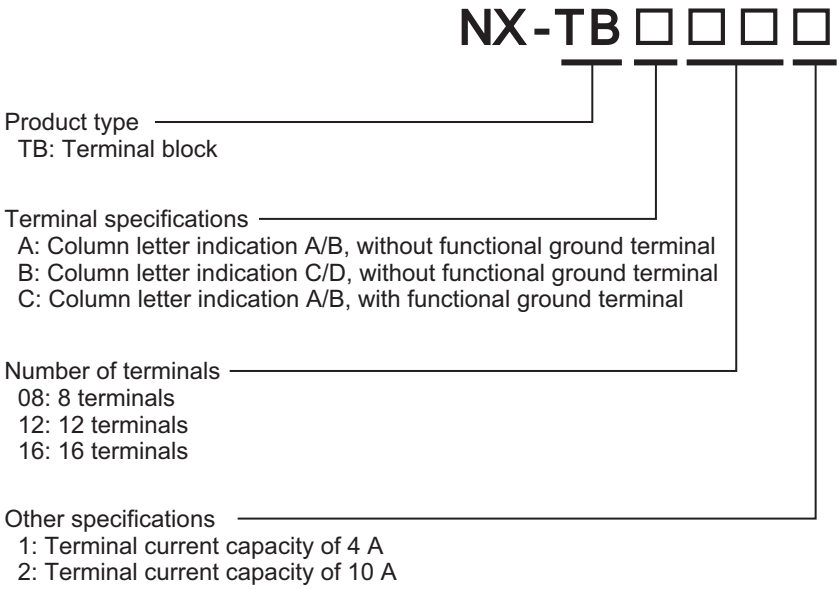
*7. The year, month, and day of production are assigned to the "lot number".
Bits 24 to 31: Date of production
Bits 16 to 23: Month of production
Bits 8 to 15: Year of production
Bits 0 to 7: Reserved

*8. The hardware version is assigned in ascending order from the earliest number of array elements. Any remainder elements are filled with spaces.

A-4 List of Terminal Block Models

A-4-1 Model Notation

The Terminal Block models are assigned based on the following rules.


NX-TB□□□□
Product type
TB: Terminal block
Terminal specifications
A: Column letter indication A/B, without functional ground terminal
B: Column letter indication C/D, without functional ground terminal
C: Column letter indication A/B, with functional ground terminal
Number of terminals
08: 8 terminals
12: 12 terminals
16: 16 terminals
Other specifications
1: Terminal current capacity of 4 A
2: Terminal current capacity of 10 A

A-4-2 List of Terminal Block Models

The following table shows a list of Terminal Blocks.

Terminal Block model	Number of terminals	Ground terminal	Terminal current capacity
NX-TBA081	8	Not provided	4 A
NX-TBA121	12		
NX-TBA161	16		
NX-TBB121	12		
NX-TBB161	16		
NX-TBA082	8		10 A
NX-TBA122	12		
NX-TBA162	16		
NX-TBB122	12		
NX-TBB162	16		
NX-TBC082	8	Provided	
NX-TBC162	16		

Note When you purchase a Terminal Block, purchase an NX-TB□□□2.

A-5 Version Information

This section describes the relationship between the unit versions of each Unit and the EtherCAT Coupler Units, CPU Units, and Sysmac Studio versions, and the specification changes for each unit version of each Unit.

A-5-1 Relationship between the Unit Versions of Each Unit and the EtherCAT Coupler Units, CPU Units, and Sysmac Studio Versions

The relationship between the unit versions of each Unit and the EtherCAT Coupler Unit, CPU Units, and Sysmac Studio version are shown below.

With the combinations of the unit versions/versions shown below, you can use all the functions that are supported by each unit version of each Unit model.

Use the unit versions/versions that correspond to the NX Unit models and the unit versions or the later/higher versions.

You cannot use the specifications that were added or changed for the relevant NX Unit models and the unit versions unless you use the corresponding unit versions/versions.

Refer to the user's manuals for the specific Units for the functions that were added or changed for each unit version update of the Communications Coupler Units or NX Units.

Refer to the *NX-series Data Reference Manual* (Cat. No. W525-E1-03 or later) for information on the relationship between the support functions of the Communications Coupler Units and restrictions on the NX Units.

NX Units		Corresponding unit versions/versions		
Model	Unit version	EtherCAT Coupler Units NX-ECC201/ECC202	NJ-series CPU Units NJ501-□□□□/ NJ301-□□□□	Sysmac Studio
NX-PD1000	Ver.1.0	Ver.1.0	Ver.1.05	Ver.1.06
NX-PF0630				
NX-PF0730				Ver.1.08
NX-PC0020				Ver.1.06
NX-PC0010				
NX-PC0030				
NX-TBX01				

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